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OPERATOR'S MANUAL FOR R310(B)/ R410(B)/
R510

Part Number: 6887181260



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FOREWORD

You are now the proud owner of a KUBOTA Wheel Loader. This wheel loader is a product of KUBOTA quality engineering and manufacturing. It is made of the finest materials and under rigid quality control system. It will give you long satisfactory service. To obtain the best use of your wheel loader, please read this manual carefully. It will help you become familiar with the operation of the wheel loader and contains many helpful hints about wheel loader maintenance. It is KUBOTA's policy to utilize as quickly as possible every advance in our research. The immediate use of new techniques in the manufacture of products may cause some small parts of this manual to be outdated. KUBOTA distributors and dealers will have the most up-to-date information. Please do not hesitate to consult with them.

● Almost all the illustrations shown in this book are the Model R310(B).

California Proposition 65

WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.



SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully. It is essential that you read the instructions and safety regulations before you attempt to assemble or use this unit.

WARNING

BEFORE STARTING ENGINE

READ AND STUDY OPERATOR'S MANUAL, SAFETY MESSAGES, AND LABELS ON THE MACHINE.
LEARN & PRACTICE SAFETY USE OF CONTROLS.
CLEAR THE AREA OF ALL BYSTANDERS.

IT IS YOUR RESPONSIBILITY TO UNDERSTAND AND FOLLOW MANUFACTURE'S INSTRUCTIONS ON MACHINE OPERATION AND TO OBSERVE PERTINENT LAWS AND REGULATIONS.
OPERATOR'S MANUAL AND PARTS CATALOG MAY BE OBTAINED FROM YOUR EQUIPMENT DEALER.

ABBREVIATION LIST

Abbreviations	Definitions
ASTM	American Society for Testing and Materials, USA
ISO	International Organization for Standardization
MIL	Military Specifications and Standards
OSHA	Occupational Safety and Health Administration
ROPS	Roll-Over Protective Structures
RPM	Revolutions Per Minute
SAE	Society of Automotive Engineers, USA
SMV	Slow Moving Vehicle
FOPS	Falling Object Protective Structure
LST	Load Sensing Transmission

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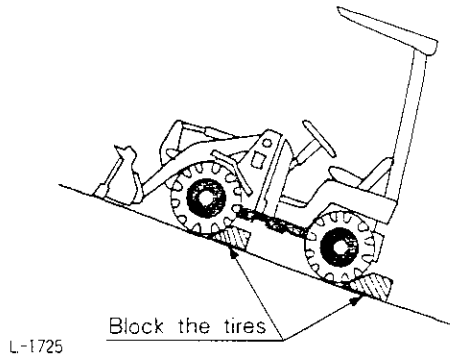
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SAFE OPERATION

1. OPERATING SAFELY

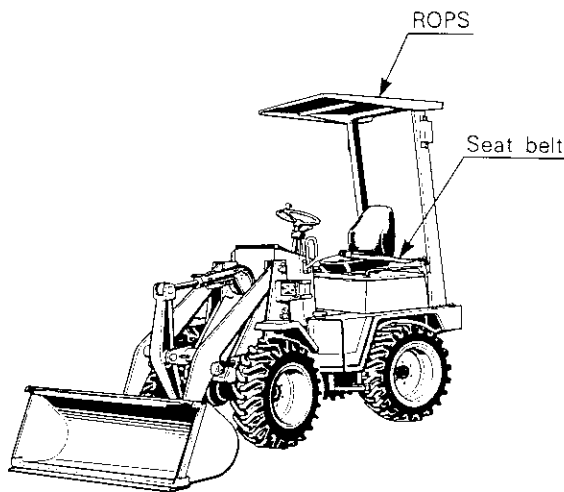
- (1) Read the entire manual before attempting to start and operate the machine.
- (2) Pay special attention to the warning and caution labels on the machine.
- (3) Do not start or operate an unsafe machine. Before working the machine, be sure that any unsafe condition has been satisfactorily remedied. Check brakes and steering and attachment controls before moving. Consult with the proper maintenance authority if any malfunctioning part of system is observed. Be sure all protective guards or panels are in place, and all safety devices provided are in place and in good operating condition.
- (4) If using an attachment with the machine, read the attachment operator's manual to ensure safe operating procedures.
- (5) Before allowing other people to use your machine, give instruction to the operator on safe and correct use of the machine and make sure the operator reads and understands the Operator's Manual for the machine.
- (6) Watch where you are going at all times. Watch for and avoid obstacles.
- (7) Know your equipment and its limitations.
- (8) Never permit passengers on the machine. Keep bystanders away from the machine during operation.
- (9) Wear and use safety items such as non-skid safety shoes or boots, safety glasses and safety hardhats. Do not operate or work around the machine, when wearing loose, bulky clothing.
- (10) Never operate the machine or any equipment while under the influence of alcohol or other drugs, or while fatigued.
- (11) When working in cooperation with other machine, let the other drivers know what you are doing at all times.
- (12) Before starting the engine, fasten the seat belt, make sure that the shuttle change lever is set at the neutral position, that the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) is set at the parking (P) position and that the bucket is lowered to the ground.
- (13) Do not start engine by shorting across starter terminals.
- (14) Inspect your seat belt daily for signs of fraying, wear or other weakness that could lead to failure.
- (15) Use the steps and handrails when dismounting. Do not jump on or off. Though the control levers are provided with locks, never hold them when getting on or off.



- (16) When dismounting or servicing the machine, stop the engine, set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking \textcircled{P} position, lower the bucket and attachment to the ground, lock all control levers in neutral, and remove the key.

If the machine has to be parked on a slope, be sure to block the tires securely.

- (17) Do not use the loader bucket or attachment to lift or carry a person.
- (18) Never allow anyone to get under or near the bucket or attachment when it is raised.
- (19) When raising the bucket or attachment, take extra caution to prevent it from touching overhead wires or other obstacles. Contact with wires may cause death by electric shock.
- (20) Do not use the bucket or any other working attachment of the machine for crane work. Otherwise, the machine may lose its balance and overturn.
- (21) Keep away from the muffler while the engine is running and immediately after it has stopped.
- (22) All equipment left unattended at night adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors to identify the location of the equipment.





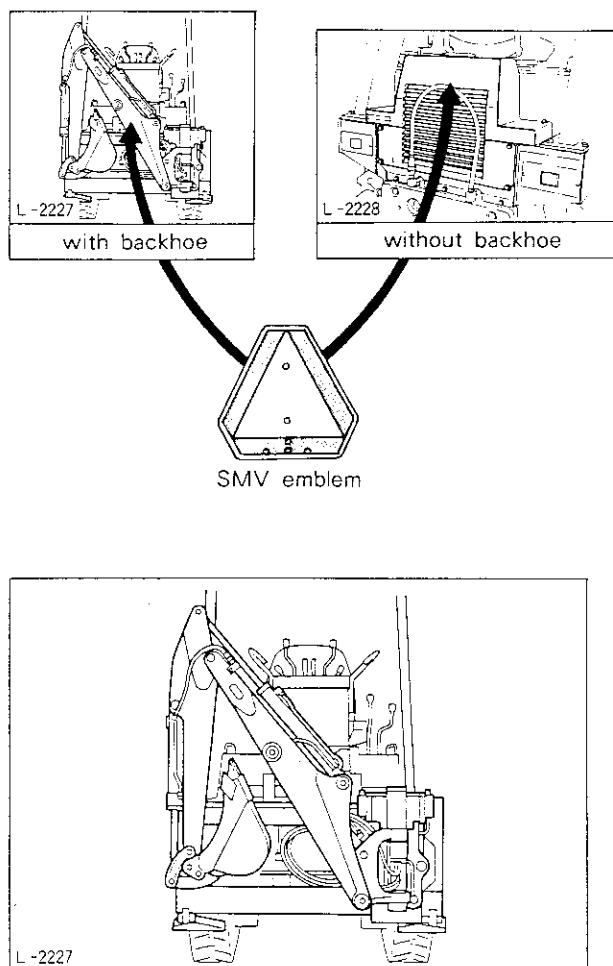
2. OPERATE SENSIBLY

- (1) For your safety, ROPS (Roll-Over Protective Structures) with a seat belt is installed by KUBOTA. Always use seat belt when the machine is equipped with a ROPS. ROPS is required on wheel loaders, dozertractors, truck type loaders, graders and scrapers by OSHA and SAE regulations.
- (2) Never modify structural members of ROPS by welding, drilling, bending, grinding or cutting, as this may weaken the structure. If any component is damaged, replace it. Do not attempt repairs. If ROPS is loosened or removed for any reason, make certain all parts are reinstalled correctly. Tighten mounting bolts to proper torque, see ROPS installation instructions. (Page 18)

- (3) Do not install any attachments, including water and calcium chloride that is added into the tires, that will cause the total gross weight of the machine to exceed the weight shown in the "FOR MAXIMUM GROSS MACHINE WEIGHT" space on the ROPS label.

Exercise care so that the ROPS canopy and CAB do not hit an object. The machine's height is 2,365 mm (93.1") [R310, 2 post ROPS], 2,370 mm (93.3") [R310, ROPS CAB], 2,430 mm (95.7") [R410, 2 post ROPS, ROPS CAB], 2,700 mm (106.3") [R510, 2 post ROPS], or 2,675 mm (105.3") [R510, ROPS CAB].

- (4) Unreasonable operation such as on dangerous terrain, beyond the load capacity or beyond the intended use of the machine must be avoided as it may cause the machine to tip over.
- (5) Be sure to place the Hi-Lo shift lever (R310-R410) or the Hi-Lo switch (R510) in the  position before entering ungraded terrain.
- (6) Do not drive the machine close edges of ditches or banks which may collapse under the weight of the machine, especially when the ground is loose or wet.
- (7) Slow down for turns, uneven terrain and slopes to avoid tip over.
- (8) When transporting a load, keep the loader bucket as low as possible to avoid tip over. Be extremely careful when working on inclines.
- (9) Operation on slopes can be dangerous. Rain, snow, gravel soft ground, etc. will change the ground conditions.
Do not operate the machine in questionable ground conditions.
If operating on a slope or ramp, always set the Hi-Lo shift lever (R310-R410) or the Hi-Lo switch (R510) at the low  position, travel straight up and down the incline and not across.
Keep the bucket as low as possible.
If you do not follow these instructions, the machine can go out of control and tip over.
- (10) Avoid turning on a slope.
- (11) Never perform digging or shoveling with the machine in the articulated condition, or the machine may tip over.
- (12) Never dig or shovel at high speed. Such operation can cause the machine to lose stability and its rear wheels to lift off the ground, which may lead to serious personal injury or death.
- (13) Do not go up or down a 30° or steeper hill. Otherwise, the machine may skid sideways or turn on its side. If the ground is ungraded or soft, limit the slope below 15°.
- (14) To avoid possible machine tip over, do not operate the machine in any site whose terrain cannot be ascertained, such as ground covered with seeds or snow and check for hidden projections, dents, road shoulders, etc. beforehand, and take care not to approach them during work.
- (15) Be sure to ease up on the accelerator at the end of backfilling grooves, or areas at the edge of cliffs or pond banks, or at the end of an ascent: Upon removal of the external load, the machine speed will automatically increase, reduce speed to avoid entering grooves or tipping over.
- (16) To avoid machine slip or tipping over, do not operate the machine on ungraded or soft terrain, such as fill-up ground. Grade and compact the site beforehand at all times.



3. TRAVELING

- (1) Before traveling on the public road, observe all local and state traffic regulations. Use SMV emblem and warning flashers as required. (SMV: Slow Moving Vehicle)
- (2) Roll Over Protective Structures are required on wheel loaders, dozer tractors, track type loaders, graders and scrapers by OSHA and SAE regulations. Do not operate this machine without a Roll Over Protective Structures.

Seat belt are required to be provided with Roll Over Protective Structures by OSHA.

Keep the safety belt fastened around you during operation.
- (3) When operating the machine with backhoe on public roads, put the backhoe at the right side, and retract the bucket and fixed dipperstick fully as shown lefthand. Secure with the backhoe locking hook.
- (4) When traveling on a public road or traveling, lock the bucket and attachments securely so that they cannot lower, even if any control lever is operated. Lift the bucket about 40 cm (1'3 1/4") above the ground and set it in the proper position for travel, then completely lock the bucket lever with the lock handles.
- (5) Check area around the machine, then gradually increase the engine rpm and slowly move the machine. Do not move the machine abruptly.

To move the machine on a steep slope, press the accelerator pedal gradually with the Hi-Lo shift lever (R310-R410) or the Hi-Lo switch (R510) at the low ① position while releasing the inching pedal so that the machine does not move backwards.
- (6) The steering wheel for this machine will not return of itself to the straight ahead after turning a curve. Be sure to return the wheel to the straight ahead position by yourself.
- (7) When turning corners, slow the machine, and be careful not to allow the front end of the backhoe to hit anything.
- (8) When operating the machine, obey flagman safety signals and traffic signs.
- (9) Deceleration on a slope.

While descending a slope in the high-speed ② position, be extremely careful when braking or shift-changing. Especially when shift-changing from the high ② to the low ①, there is the risk of the machine rear lifting which is very dangerous.

When descending down a long slope, use the engine brake. (Run the engine at relatively high speed and select the low-speed ① position.)

- (10) Use the brake when the machine begins to accelerate.
- (11) Before climbing a slope, operate the machine with the low-speed D so that the machine can climb to the top easily without shift-changing on the way.
- (12) If the engine should stall on a slope, apply the brake to hold the machine in a present position and then set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking P position, lower the bucket to the ground to prepare for the next start.
- (13) When crossing over an obstacle such as a rock, cross at a right angle, and slow the machine. Trying to cross over it diagonally or at high speed may tip over the machine.
- (14) If there is the risk of the machine slipping excessively on frozen ground, install chains on the front wheels; for operation on snow, install chains on both front and rear wheels.
- (15) Do not turn sharply at high speed, or the machine may tip over.
- (16) Steering lose will result if the engine is stopped during travel. Do not stop the engine during travel.
- (17) Never set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking P position during traveling.
Doing so will result in sudden machine stop, raising of rear wheels and possible transmission damage.
- (18) If a tire has blown, the machine may slip or turnover. To avoid turnover, do not brake or steer hard, brake slowly to stop the machine gradually.

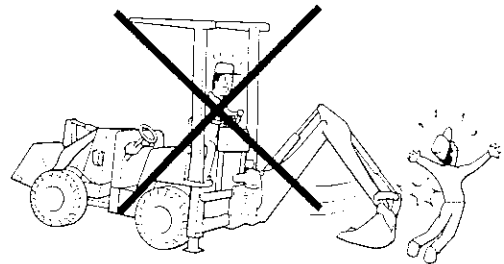
■ Precaution at Overheating

Take the following actions in the event the coolant temperature be nearly or more than the boiling point, what is called "Overheating".

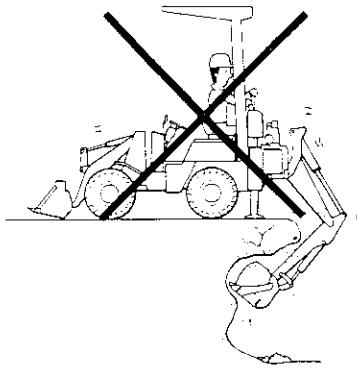
- (1) Stop the machine operation in a safe place and keep the engine unloaded idling.
- (2) Don't stop the engine suddenly, but stop it after about 5 minutes of unloaded idling.
- (3) Keep yourself well away from the machine for further 10 minutes or while the steam blown out.
- (4) Checking that there gets no danger such as burn, get rid of the causes of overheating according to the manual, see "Troubleshooting" section. And then, start again the engine.

4. DURING OPERATING WITH A BACKHOE

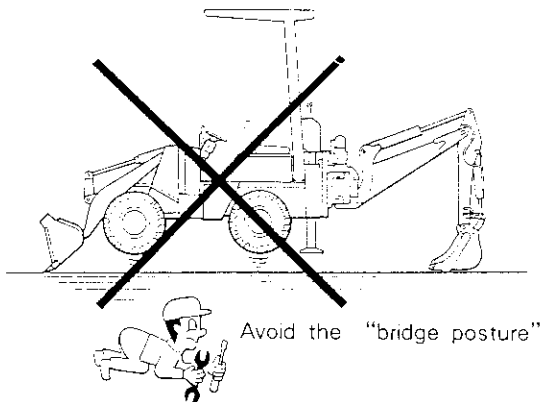
- (1) The machine must be moved back and forth to attach or detach the backhoe. To ensure safety, the operator should be helped by an assistant and they should work closely with each other.
- (2) When the backhoe is removed, the machine's balance is changed.
Mount counterweights in place of the backhoe to ensure the stability of the machine and to avoid the danger of tipping over while shoveling.
- (3) Before starting work, look around the machine to check that there are no bystanders or obstacles near by.



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L -2231

- (4) The machine's balance changes greatly when the backhoe is slid. This means that sliding the backhoe on a slope or on irregular terrain increases the chance that the machine will tip over. Be sure to slide the backhoe on flat and firm ground to facilitate work and to prevent it from tipping over.
- (5) When working with a backhoe, lower the outrigger floats and the shovel bucket to stabilize the machine. Working with a backhoe without lowering the outrigger floats will cause the machine to incline or move back and forth. This is extremely dangerous.
- (6) Operate backhoe from backhoe operator's seat only.
- (7) Before moving the machine, always be in the seat (seat in loader position). Raise the loader bucket and stabilizers sufficiently to clear the ground, and then drive the machine forward.
After the machine has been positioned. Engage the parking brake and shift transmission controls to neutral.
Lower the loader bucket and stabilizers and level the machine.
- (8) Do not dig around the outrigger floats or tires. If the ground collapses, the machine may fall into the area excavated and result in serious personal injury or death.
- (9) When leaving the machine, stop the engine, set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking Ⓟ position, lower the bucket and attachment to the ground, lock all control levers in neutral, and remove the key.
- (10) Operate backhoe from proper operator's seat position only. Any other method could result in serious injury.
- (11) When operating the backhoe, lock the shuttle change lever in neutral, set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking Ⓟ position, and lock the bucket operating lever with the bucket on the ground.
- (12) Never get under the machine while it is being lifted with only the bucket, backhoe, or outriggers. If servicing or checking underneath, support it firmly with strong blocks, etc. If you do not follow this, serious injury and death can result.

5. POSSIBLE HAZARDS

Check that no one is near the muffler exhaust before starting the engine. If exposed to exhaust fume, he or she may get burned or poisoned. Check that there is no flammable objects, such as dead leaves, sheets of paper, or pieces of cloth, attached to areas around the engine before starting the engine.

■ Exhaust Fumes

To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building without proper ventilation. Carbon monoxide is odorless, colorless, and deadly.

■ Fires

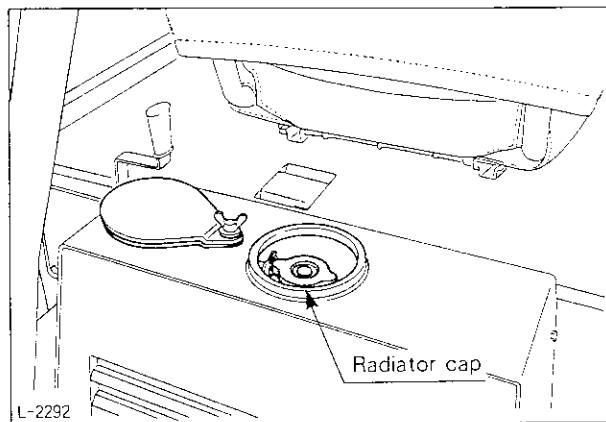
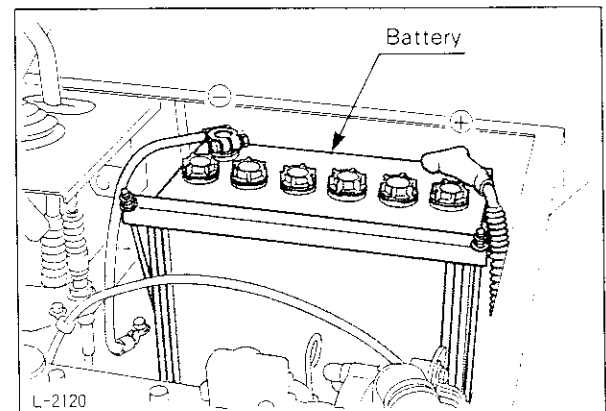
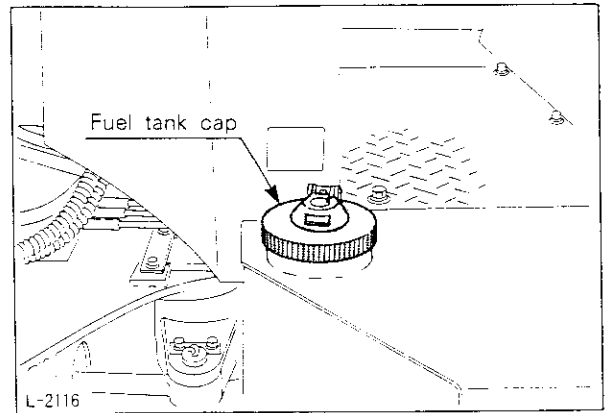
- (1) Always stop the engine before refueling. Keep away from sparks and flames, while refueling.
- (2) Avoid fuel spills and overfilling the fuel tank.
- (3) Keep first aid kit and fire extinguisher nearby at all times.

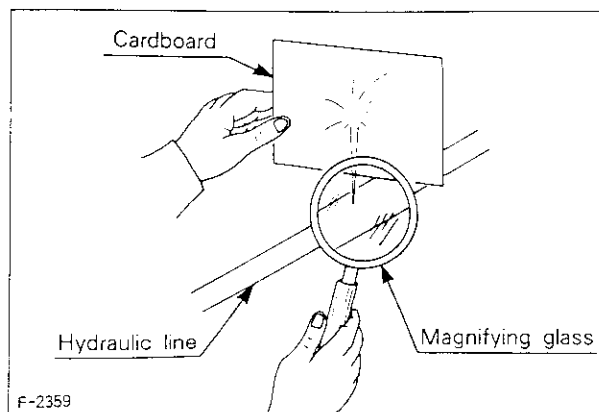
■ Explosions

- (1) A battery, especially when charging, will give off hydrogen and oxygen gases that are very explosive. Keep away from sparks and open flames at all times.
- (2) To avoid sparks from an accidental short circuit, always disconnect the battery ground cable \ominus first and always reconnect the ground cable \ominus last. Refer to section 6.3 (page 81).

■ High Pressure Fluids

- (1) Never remove the engine/hydraulic oil plug or the radiator cap right after the engine has been stopped, or oil or hot coolant may gush out. Wait for the coolant or oil to cool, loosen the plug or cap just a little to release pressure, and then check the level. This is especially important for the radiator.





- (2) Escaping hydraulic fluid under pressure can have sufficient force to penetrate skin, causing serious personal injury. Before applying pressure to the system, be sure that all connections are tight and that lines, pipes and hoses are not damaged. Fluid escaping from a very small hole can be almost invisible.

Don't use hands to search for suspected leaks, use a piece of cardboard or wood.

If injured by escaping fluid, see a doctor at once. Serious infection or reaction may result if proper medical treatment is not administered immediately.

■ Safe Servicing

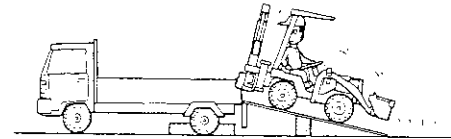
- (1) Before checking, adjusting or cleaning the machine parts, or leaving the machine, observe the following items.
 - Stop the engine.
 - Set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking (P) position.
 - Lower the bucket and attachment to the ground.
 - Lock all control levers in neutral.
 - Remove the key.
 - Secure the hood cover firmly.
- (2) Never be under the machine while it is being lifted with only the loader bucket, backhoe, or the outriggers. If servicing or checking underneath, support it firmly with the strong jackstands.
- (3) Before servicing, secure the front and rear frames with the steering frame lock.
- (4) Keep clear of articulation area when servicing.
- (5) When checking or servicing the electric system, disconnect the battery terminals.
- (6) It is dangerous to drain oil or coolant and to replace the filter just after stopping the engine. Wait for the machine to cool.
- (7) Do not allow an unauthorized person to service or maintain the machine. Do not perform any work or equipment that is not authorized. Do not try to do any repairs that you do not understand. Follow the Maintenance and Service procedures.
- (8) To avoid personal injury from escaping high pressure oil, lower hydraulic pressure by moving the control levers to all positions after stopping the engine.
- (9) Service or check the machine after it has completely cooled off. Do not touch the muffler and the radiator until they have cooled off.
- (10) When you drive connecting pins in or out, guard against injury from flying pieces of metal. Use eye or face protection.
- (11) Keep all safety covers, shields, and guards in place at all times.

6. TRANSPORTATIONS AND STORAGE

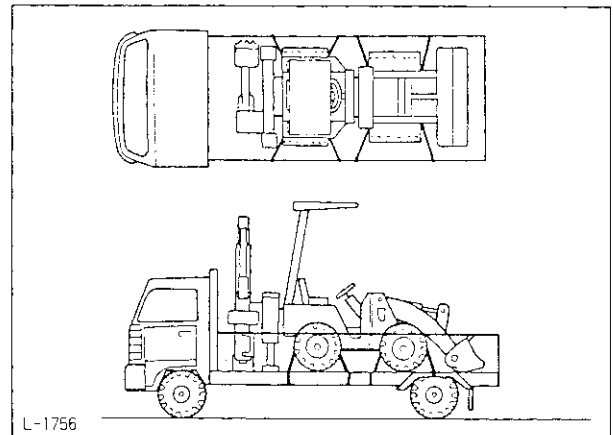
- (1) When loading or un-loading the machine on or from a truck or trailer, be sure to use strong planks. Never use wet lumber, etc.
- (2) Keep the planks at an angle such that the machine can be kept stable (10 to 15°). Never try to change directions while on the planks.
- (3) When loading or un-loading, keep the bucket low and drive at low speed.
- (4) It is dangerous to alter the climbing direction or shift the Hi-Lo shift lever (R310-R410) or the Hi-Lo switch (R510) once already on the ramps. If direction of climb needs correction, be sure to first bring the machine down off the ramps and make the directional correction.
- (5) If a hydraulic lever is operated while the machine is loaded or unloaded, the machine may move at an angle. Be sure to stop the machine before using another control.

While loading or un-loading the machine, block the truck tires and apply the truck parking brake. If necessary, place a support under the truck bed behind the rear tires to prevent the truck front from lifting.

- (6) After loading the machine on the truck bed, do the following.
 - Check to see that the machine's center point aligns with that of the truck bed.
 - Secure the steering frame lock and attachment.
 - Stop the engine.
 - Set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking \textcircled{P} position.
 - Lower the bucket and attachment to the truck bed and lock it.
 - Lock all control levers in neutral.
 - Remove the key.
 - Block the machine's wheels.
 - Secure with chains.
- (7) While traveling with the machine loaded, do not start with a jerk, stop suddenly or make sharp turns on curves so as to prevent the machine from shifting on the truck bed.
- (8) For storage, be sure to cover machine after all the heated parts have cooled down.
- (9) Before storing the machine for long periods of time, do the following.
 - Stop the engine.
 - Set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking \textcircled{P} position.
 - Lower the bucket and attachment to the ground.
 - Lock all control levers in neutral.
 - Remove the key.
- (10) Avoid running the engine for a long time indoors. When the engine must be run indoors, be sure to open the windows and doors. Carbon monoxide gas from exhaust is colorless, odorless and deadly.



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L-1756

7. SAFETY LABELS

❶ Part No. 68285-5782-3

⚠ CAUTION

TO AVOID PERSONAL INJURY:

DO NOT OPERATE THE MACHINE WITHOUT ROPS (ROLL OVER PROTECTIVE STRUCTURES) AND WITHOUT THE SEAT BELT FASTENED. NEVER MODIFY STRUCTURAL MEMBERS OF THE ROPS, AS YOU MAY WEAKEN THE STRUCTURE IF ANY COMPONENT IS DAMAGED, REPLACE IT. DO NOT ATTEMPT REPAIRS.

❷ Part No. 68851-5773-2

⚠ WARNING

TO AVOID PERSONAL INJURY:

- READ AND UNDERSTAND THE OPERATOR'S MANUAL AND ALL LABELS ON THE MACHINE.
- KNOW HOW TO OPERATE ALL CONTROLS.
- DO NOT ALLOW ANY BYSTANDERS AROUND OR NEAR THE MACHINE.
- NEVER ALLOW PASSENGERS ON THE MACHINE.
- WHEN PARKING OR DISMOUNTING THE MACHINE, STOP THE ENGINE, SET THE PARKING BRAKE, LOWER THE BUCKET AND ATTACHMENT TO THE GROUND, LOCK ALL CONTROL LEVERS IN NEUTRAL, AND REMOVE THE KEY.
- DO NOT GET UNDER THE MACHINE WHILE IT IS BEING LIFTED WITH ONLY THE BUCKET, BACKHOE, OR OUTRIGGERS WHEN SERVICING OR CHECKING UNDERNEATH. SECURELY SUPPORT WITH JACKSTANDS.
- DO NOT STAND, WALK OR WORK UNDER RAISED LOADER OR ATTACHMENT UNLESS THE LIFT ARM SUPPORT DEVICE IS USED TO SECURE THE LIFT ARMS.

❸ Part No. 68851-5772-1

⚠ CAUTION

SECURE STEERING FRAME LOCK BEFORE SERVICING OR HAULING THE MACHINE.

TO ATTACH THE STEERING FRAME LOCK:

- ALIGN FRONT AND REAR FRAMES.
- SHUT OFF ENGINE AND REMOVE THE KEY.
- ATTACH STEERING FRAME LOCK WITH HAIR PINS.
- IF HOLES ARE NOT ALIGNED, MOVE THE STEERING WHEEL SLIGHTLY WITH THE ENGINE OFF.

❹ Part No. 68708-5745-1

⚠ WARNING

TO AVOID POSSIBLE INJURY OR DEATH FROM MACHINE RUN AWAY:

- DO NOT START ENGINE BY SHORTING ACROSS STARTER TERMINALS. MACHINE MAY START AND MOVE IF NORMAL STARTING CIRCUITRY IS BYPASSED.
- START ENGINE ONLY FROM OPERATOR'S SEAT. NEVER START ENGINE WHILE STANDING ON GROUND.

❺ Part No. 68851-5768-1

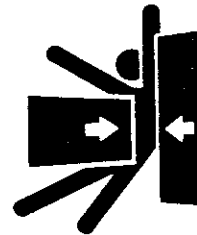
⚠ WARNING

TO AVOID SERIOUS PERSONAL INJURY OR DEATH:

ALWAYS USE THE LIFT ARM SUPPORT DEVICE WHEN SERVICING THE MACHINE WITH THE LOADER SHOVEL FRAMES RAISED.

❻ Part No. 68851-5771-1

⚠ DANGER



KEEP OUT OF THIS AREA TO AVOID SERIOUS PERSONAL INJURY OR DEATH.

L-2223

❼ Part No. 68285-5758-3

⚠ WARNING

TO AVOID PERSONAL INJURY:

STAY CLEAR OF BOOM PINCH POINTS.

⑧ Part No. 68851-5769-2

⚠ WARNING

TO AVOID SERIOUS PERSONAL INJURY OR DEATH:

- ALWAYS DRIVE OR OPERATE STRAIGHT UP OR DOWN A SLOPE. DO NOT CROSS A SLOPE. OR THE MACHINE MAY SLIP SIDEWAYS AND TIP OVER.
- SLOW DOWN WHEN TURNING ON ROUGH, UNEVEN TERRAIN AND SLOPES TO AVOID TIPPING OVER
- WHEN TRANSPORTING A LOAD, KEEP THE LOADER BUCKET AS LOW AS POSSIBLE TO AVOID TIPPING OVER. BE EXTRA CAREFUL WHEN WORKING ON INCLINES.
- NEVER PERFORM DIGGING OR SHOVELING IN THE ARTICULATED POSITION, OR THE MACHINE MAY TIP OVER.
- DO NOT USE LOADER FOR HANDLING LARGE, LOOSE OR SHIFTABLE LOADS WHICH COULD FALL OUT OF THE BUCKET OR ROLL DOWN THE LOADERS ARMS ONTO THE OPERATOR.
- WHEN THE BACKHOE IS REMOVED, MOUNT COUNTERWEIGHTS IN PLACE OF THE BACKHOE TO ENSURE THE STABILITY OF THE MACHINE AND TO AVOID THE DANGER OF TIPPING OVER WHILE OPERATING.
- DO NOT DIG AROUND THE OUTRIGGERS OR TIRES. THE SOIL MAY COLLAPSE UNDER THE WEIGHT OF THE MACHINE AND MAY TIP OVER.

⑨ Part No. 68851-5731-2

⚠ CAUTION

TO AVOID PERSONAL INJURY:

NEVER SHIFT THE PARKING BRAKE LEVER TO THE PARK POSITION  DURING TRAVEL.

⑩ Part No. 68548-5744-2

⚠ CAUTION

TO AVOID PERSONAL INJURY:

STOP ENGINE AND ALLOW RADIATOR TO COOL BEFORE OPENING RADIATOR CAP. HOT COOLANT ESCAPING UNDER PRESSURE CAN DAMAGE THE EYES AND SKIN.

⑪ Part No. 68859-5764-3

⚠ WARNING

TO AVOID SERIOUS PERSONAL INJURY OR DEATH:

- KEEP CLEAR OF OPERATING AREA.
- OPERATE BACKHOE FROM BACKHOE OPERATOR'S SEAT ONLY.
- BEFORE MOVING THE MACHINE, ALWAYS BE IN THE SEAT (SEAT IN LOADER POSITION). RAISE THE LOADER BUCKET AND STABILIZERS SUFFICIENTLY TO CLEAR THE GROUND, AND THEN DRIVE THE MACHINE FORWARD. AFTER THE MACHINE HAS BEEN POSITIONED, ENGAGE THE PARKING BRAKE AND SHIFT TRANSMISSION CONTROLS TO NEUTRAL. LOWER THE LOADER BUCKET AND STABILIZERS AND LEVEL THE MACHINE.

⑫ Part No. 68859-5726-1

⚠ WARNING

TO AVOID PERSONAL INJURY:

STAY CLEAR OF OPERATING AREA OF THE BACKHOE.

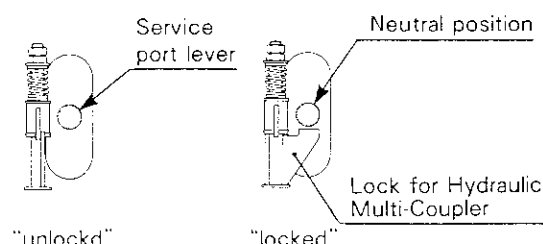
⑬ Part No. 68891-5745-1

⚠ WARNING

SERVICE PORT LEVER LOCK FOR HYDRAULIC MULTI-COUPLER

TO AVOID SERIOUS PERSONAL INJURY:

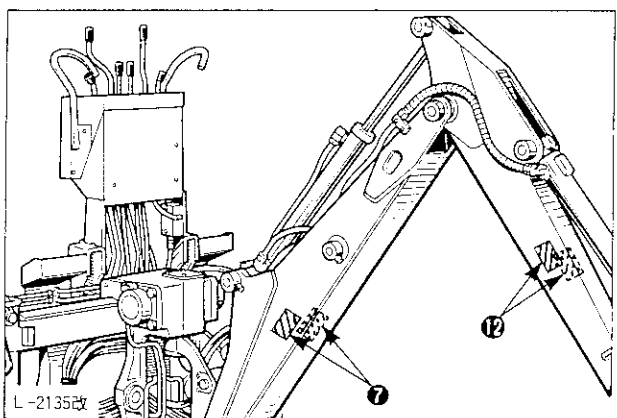
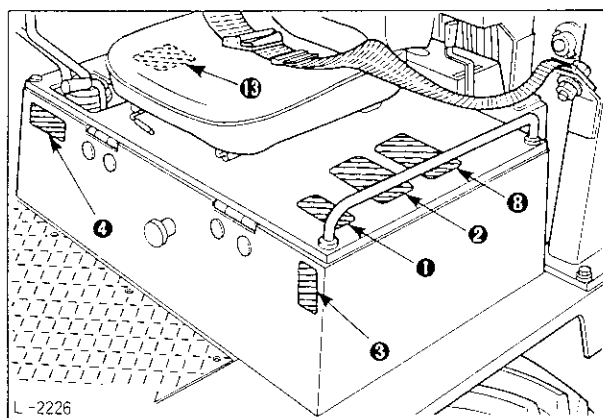
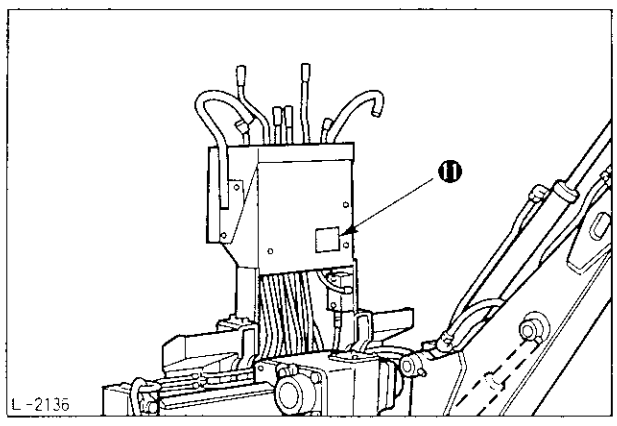
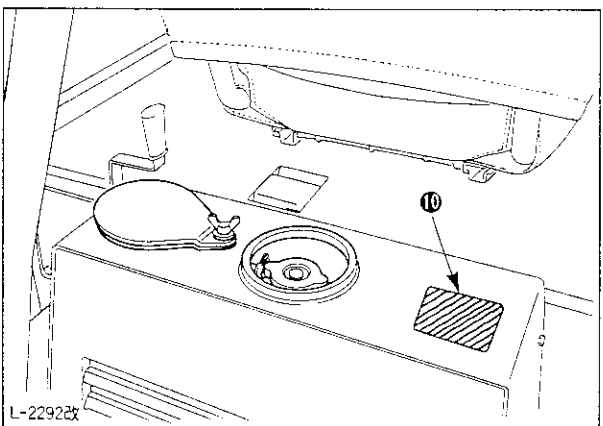
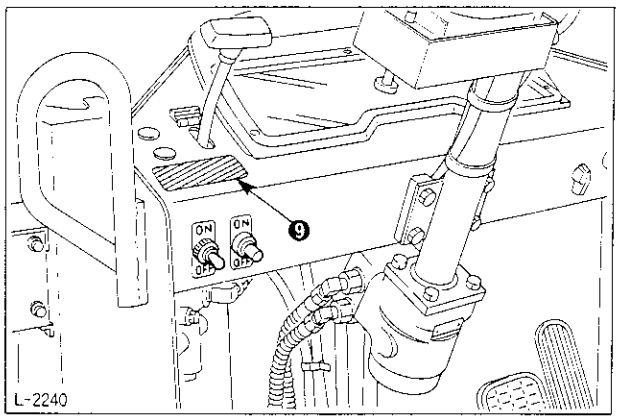
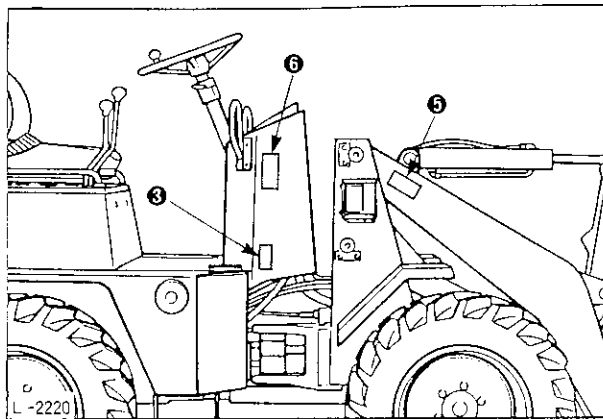
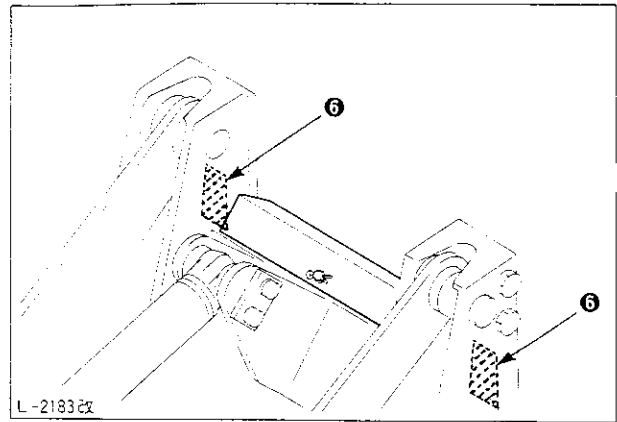
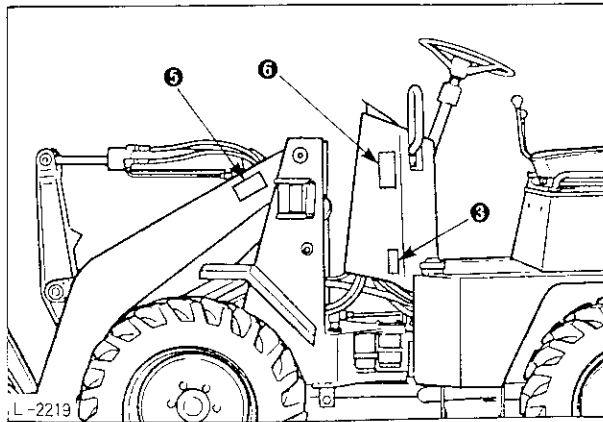
- MAKE SURE THE ATTACHMENT IS SECURELY LATCHED TO MULTI-COUPLER AND SERVICE PORT LEVER LOCK IS ENGAGED.
- FAILURE TO FOLLOW THIS PROCEDURE MAY RESULT IN SEPARATION OF ATTACHMENT FROM MULTI-COUPLER.



L-2480

CARE OF SAFETY SIGNS

- (1) Keep safety signs clean and free from obstructing material.
- (2) Clean safety signs with soap and water, dry with a soft cloth.
- (3) Replace damaged or missing safety signs with new safety signs from your Kubota dealer.
- (4) If a component with safety sign(s) affixed is replaced with new part, make sure new safety sign(s) is (are) attached in the same location(s) as the replaced component.
- (5) Mount new safety signs by applying on a clean dry surface and pressing any bubbles to outside edge.



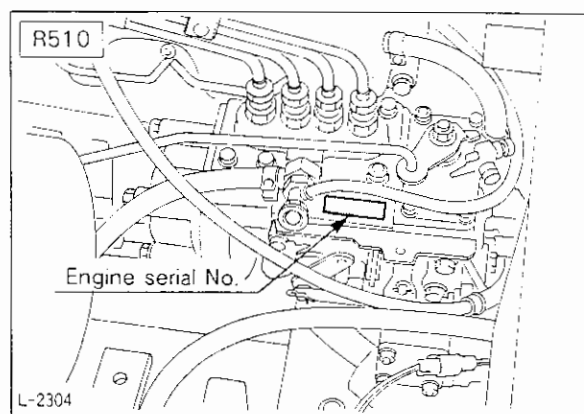
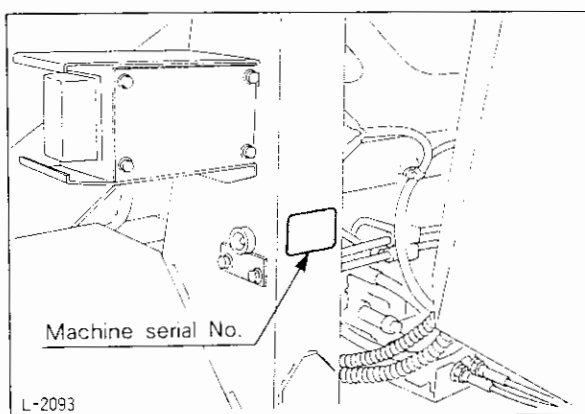
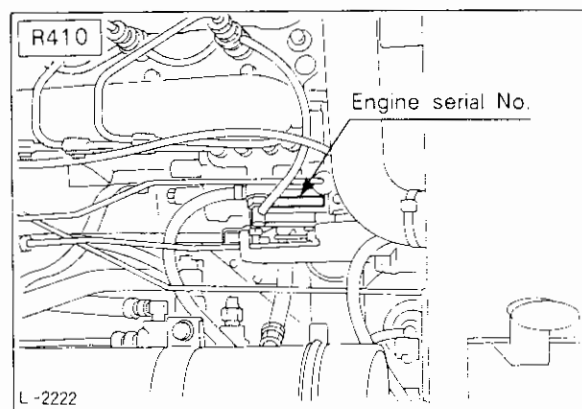
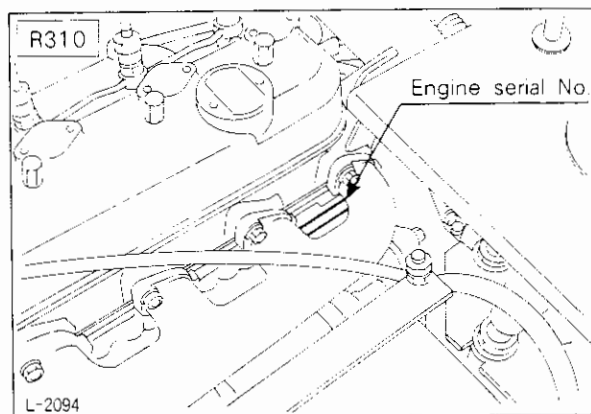
SERVICING OF WHEEL LOADER

Your dealer is interested in your new wheel loader and has the desire to help you get the most value from it. After reading this manual thoroughly, you will find that you can do some of the regular maintenance yourself. However, when in need of parts or major service, be sure to see your KUBOTA dealer.

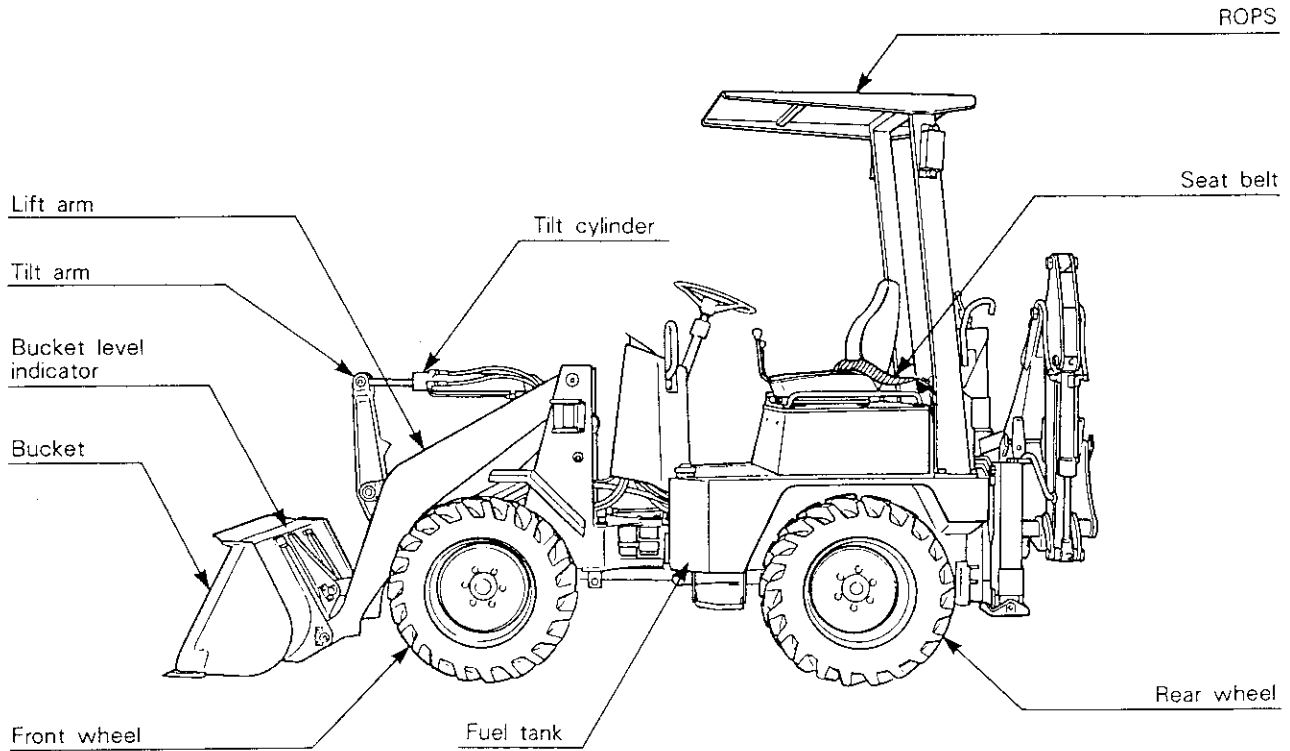
For service, contact the KUBOTA dealer/Dealership from which you purchased your wheel loader or your local authorized KUBOTA dealer.

When in need of parts, be prepared to give your dealer both the machine and engine serial numbers.

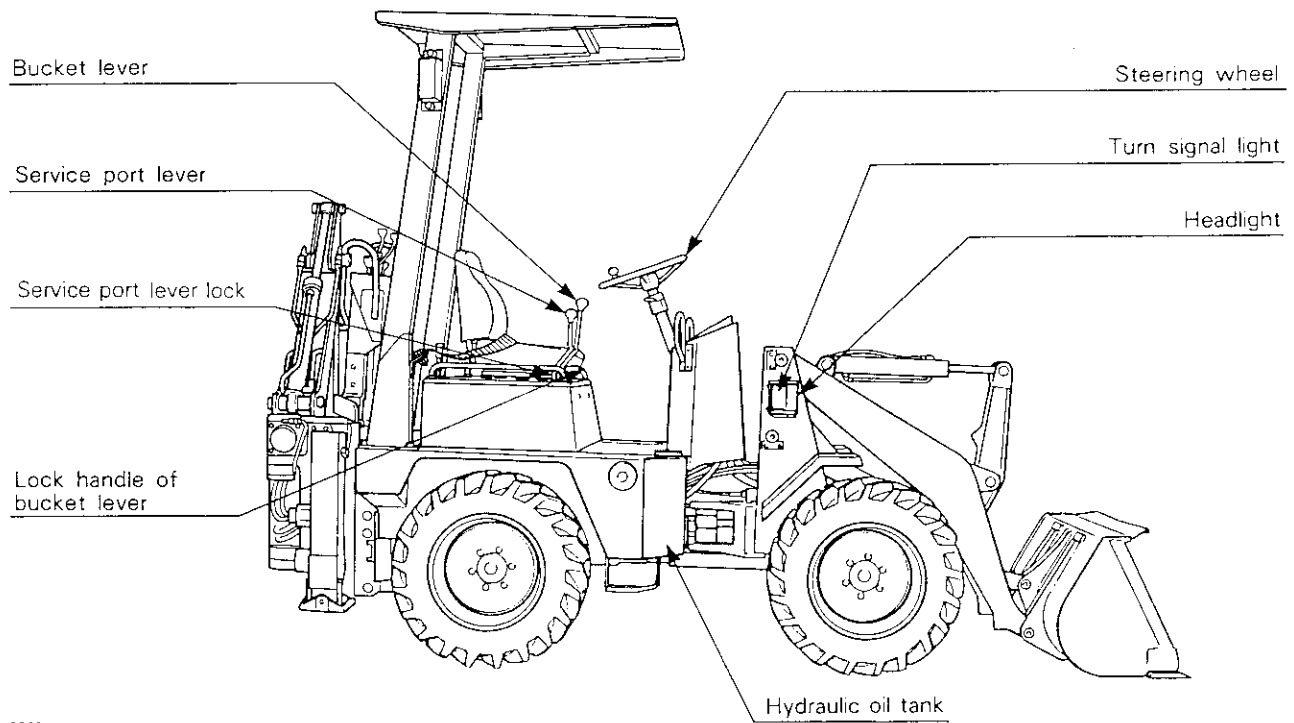
- (1) Model of machine R310(B)/R410(B)/R510 and serial number
- (2) Model of engine V1305-RP for R310(B)/V1902-BDW-3 for R410(B)/V2203-BDW for R510 and serial number



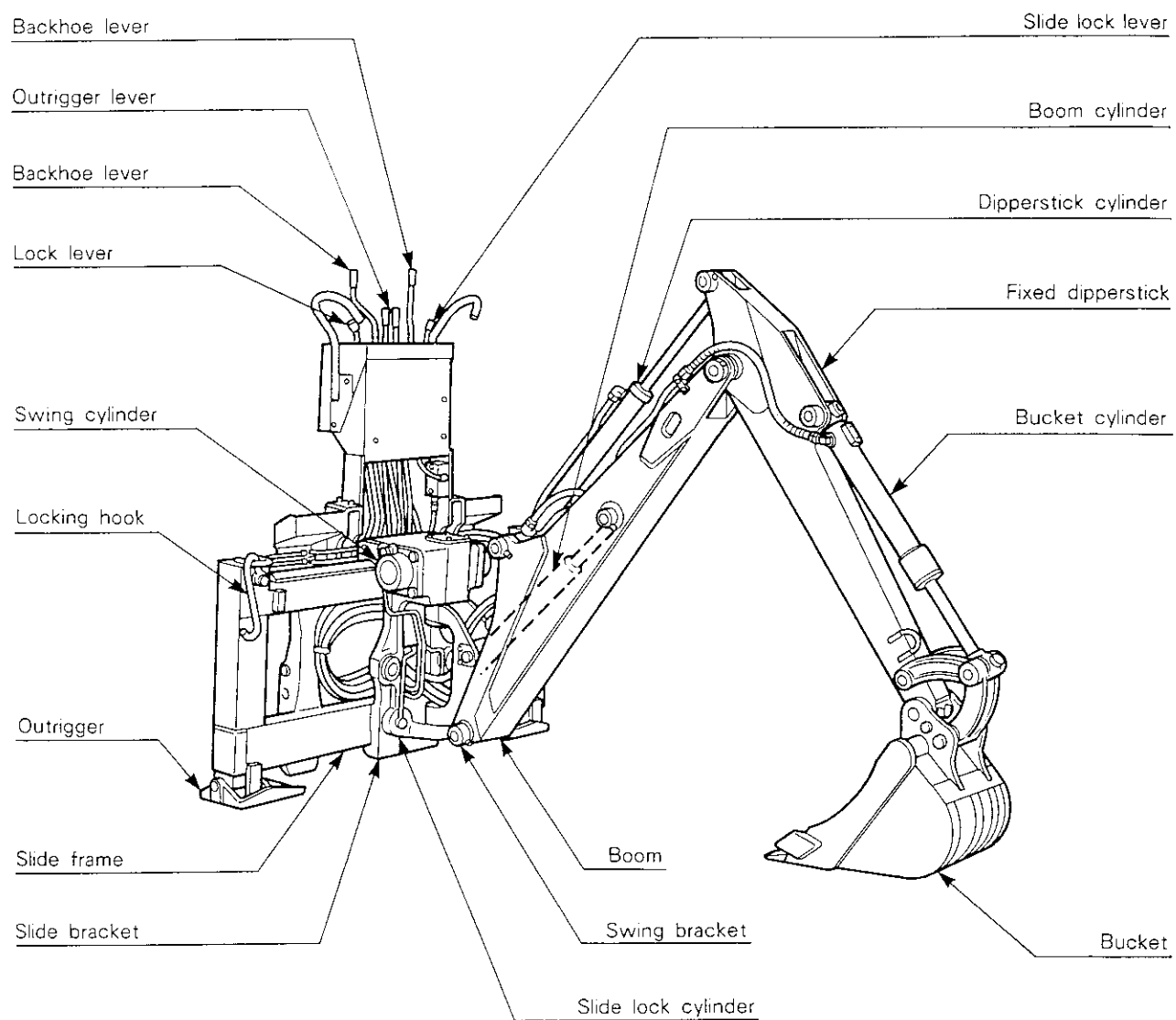
1. PART NAMES



L-2219



L-2220



2. OPERATING CONTROLS AND INSTRUCTIONS

2.1 SAFETY LEVERS AND APPLIANCE

■ Safety Key Start System

This is the safety system to prevent the machine from moving suddenly.

The Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) is to be set to the parking \textcircled{P} position before stopping the engine.

The safety key start system does not allow the engine to start when the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) is out of the parking \textcircled{P} position.

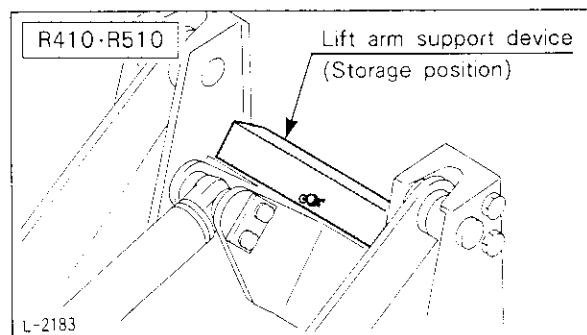
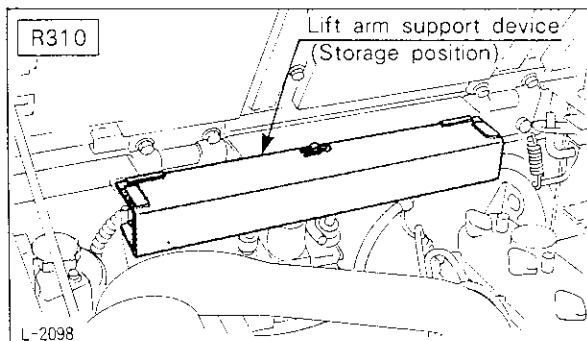
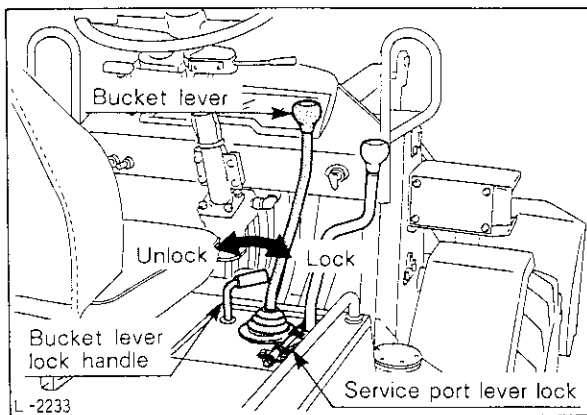
■ Bucket Lever Lock Handle

This handle is used to lock the bucket lever. With the bucket lever in neutral, move the lever all the way to the right. The bucket lever is then locked.

■ Service Port Lever Lock for Hydraulic Multi-Coupler

This lock is used to lock the service port lever. With the service port lever in neutral, move the lever all the way to the right.

After attaching the front attachment, be sure to lock the service port lever with this lock.



WARNING

To avoid personal injury:

- When dismantling the machine or when servicing the machine, be sure to stop the engine, set the shuttle change lever to the neutral position and Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking \textcircled{P} position, lower the bucket to the ground, lock the bucket lever with the bucket lever lock handle, and remove the key.

■ Lift Arm Support

The lift arm support is used to prevent the loader lift arms from falling when servicing the machine.

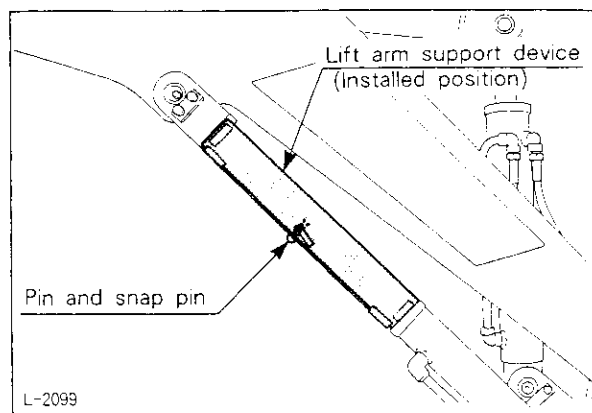
Install as follows.

- (1) Raise the loader lift arms completely.
- (2) Stop the engine and remove the key.
- (3) Insert the lift arm support onto the lift cylinder rod.
- (4) Install the pin and snap pin in the lift arm support.
- (5) Slowly lower the loader lift arms onto the lift arm support.

**WARNING**

To avoid personal injury:

- (1) Before installing the lift arm support, set the shuttle change lever to the neutral position and the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking P position, lock the bucket lever with the bucket lever lock handle, and remove the key.
- (2) Make sure the bucket is empty before attaching lift arm support.

**Operator's Seat Belt**

For your safety, ROPS with a seat belt is installed by KUBOTA. Always fasten the seat belt before you start the engine. Fasten the seat belt as shown right-hand.

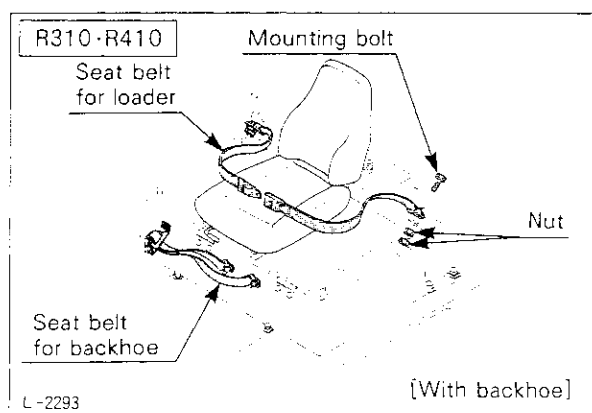
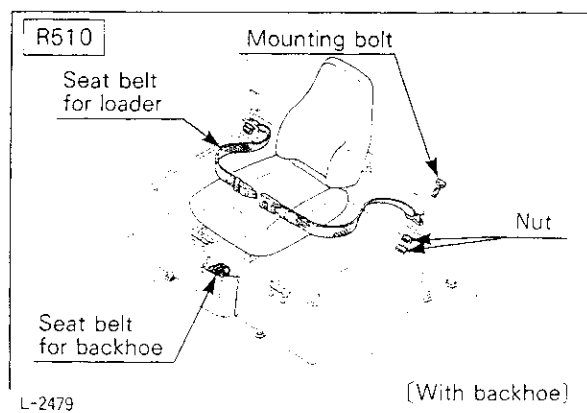
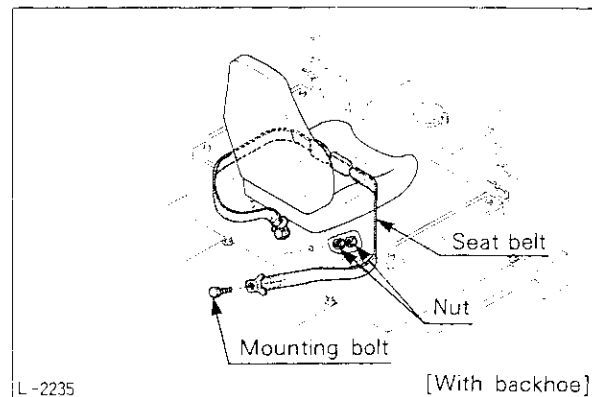
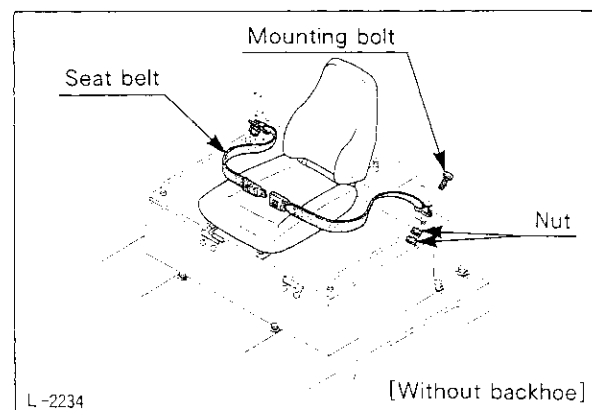
Mounting bolts	Tighten torque	
	39 to 49 lbw-ft 540 to 680 (kgf-cm)	

Mounting bolts	Size	Grade
	7/16-20UNFX1.5"	7T

**CAUTION**

To avoid personal injury:

- Place backhoe seat belts in storage position when backhoe is not being operated keeping them from becoming entangled with foot pedal controls.



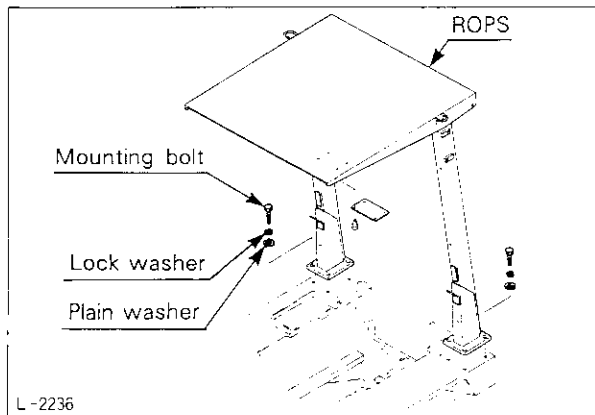
■ Roll-Over Protective Structures (ROPS)

For your safety, ROPS with a seat belt is installed with your machine. A ROPS label is fastened to the ROPS. This label shows the serial No. of ROPS, gross weight, approval and regulation No. and model No. of the machine.

ROPS MEETS REQUIREMENTS OF OSHA 1926-1001/SAE J1040C/ISO PART 3471 1980
FOPS MEETS REQUIREMENTS OF OSHA 1926-1003/SAE J1043 APR85

ROPS-FOPS MODEL KUBOTA RF120	MACHINE MODEL KUBOTA R310, R410
ROPS-FOPS SERIAL No	MAX GROSS MACHINE WEIGHT 7900 Lbf. (3600Kgf.)
ROPS PART No 68851-45211	2-47, SHIKIZUHIGASHI 1-CHOME, NANIWA-KU, OSAKA 556-91, JAPAN.

KUBOTA CORPORATION
OSAKA, JAPAN



L-2236

ROPS MEETS REQUIREMENTS OF OSHA 1926-1001/SAE J1040 FEB86/ISO PART 3471 1980
FOPS MEETS REQUIREMENTS OF OSHA 1926-1003/SAE J1043 APR85

ROPS-FOPS MODEL KUBOTA RF170	MACHINE MODEL KUBOTA R510
ROPS-FOPS SERIAL No	MAX GROSS MACHINE WEIGHT 11000 Lbf. (5000Kgf.)
ROPS PART No 68851-45211	2-47, SHIKIZUHIGASHI 1-CHOME, NANIWA-KU, OSAKA 556-91, JAPAN.

KUBOTA CORPORATION
OSAKA, JAPAN



WARNING

To avoid personal injury:

- (1) Kubota recommends the use of a ROPS (Roll Over Protective Structure) and seat belt in almost all applications. Never fasten the seat belt without a ROPS. Do not modify a ROPS in any way. Welding, bending, drilling or cutting any portion of the ROPS may weaken the structure. Do not repair a damaged ROPS. A damaged ROPS structure must be replaced, not repaired or revised. If any structural member of the ROPS is damaged, replace the entire structure at your local Kubota dealer. Check the seat belt daily and replace it if damaged or frayed.

- (2) Do not remove the ROPS except for service. Install the ROPS correctly before you operate the machine again.

Mounting bolts	Tighten torque	
	192 to 224 lbw-ft 2650 to 3100 (kgf-cm)	
Mounting bolts	Size	Grade
	M16×2.0×55	9T

- (3) Do not install any attachments that will cause the total gross weight of the machine to exceed the weight shown in the "FOR MAXIMUM GROSS MACHINE WEIGHT" space on the ROPS label.

■ Steering Frame Lock

This is used to lock the front and rear frames together to prevent the frames from articulating unexpectedly during servicing or hauling or transporting.

To attach the steering frame lock:

(Align front and rear frames.)

- (1) Shut off the engine and remove the key.
- (2) Attach steering frame lock with snap pins.
- (3) If holes are not aligned, move the steering wheel slightly with the engine off.



WARNING

To avoid personal injury:

- Secure steering frame lock before servicing, hauling or transporting this machine.

IMPORTANT:

- Store the steering frame lock securely after use.

■ Parking Brake

The parking brake is to be used when parking the machine.

When the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) is set at the parking ② position, the parking brake is applied and the monitor lamp lights on the dash panel.



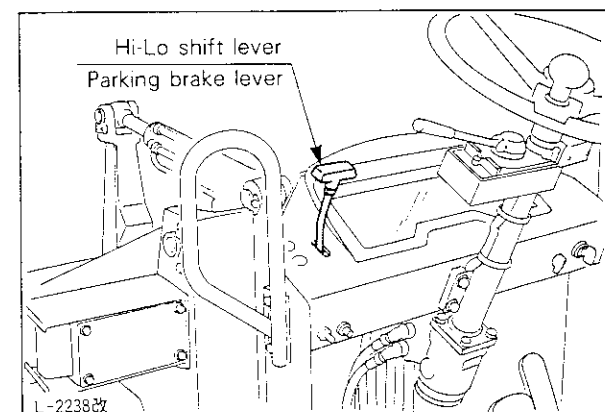
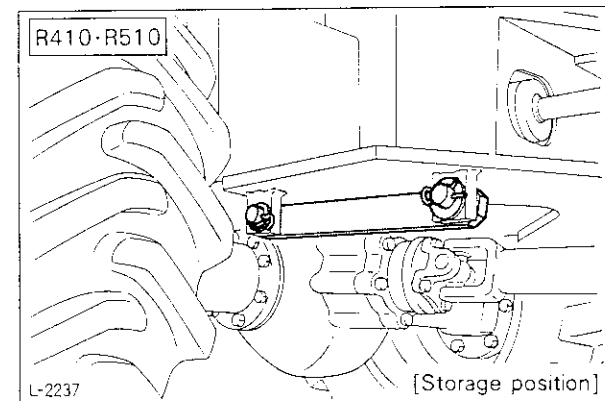
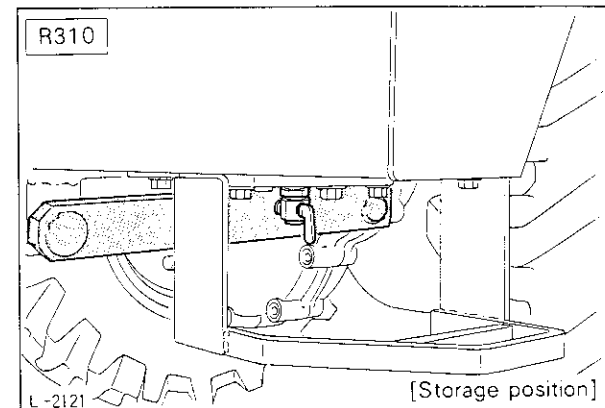
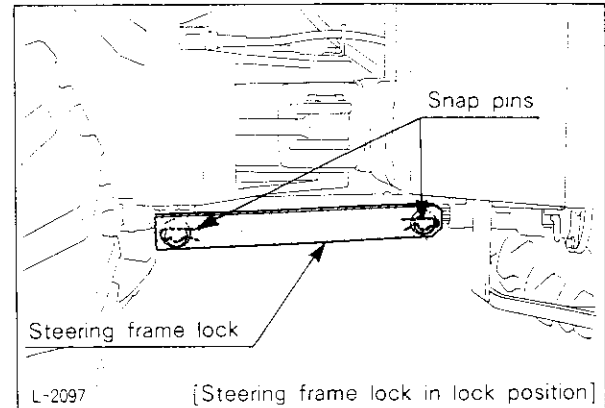
WARNING

To avoid personal injury:

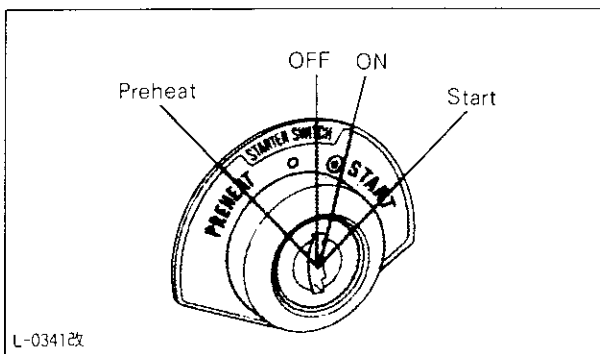
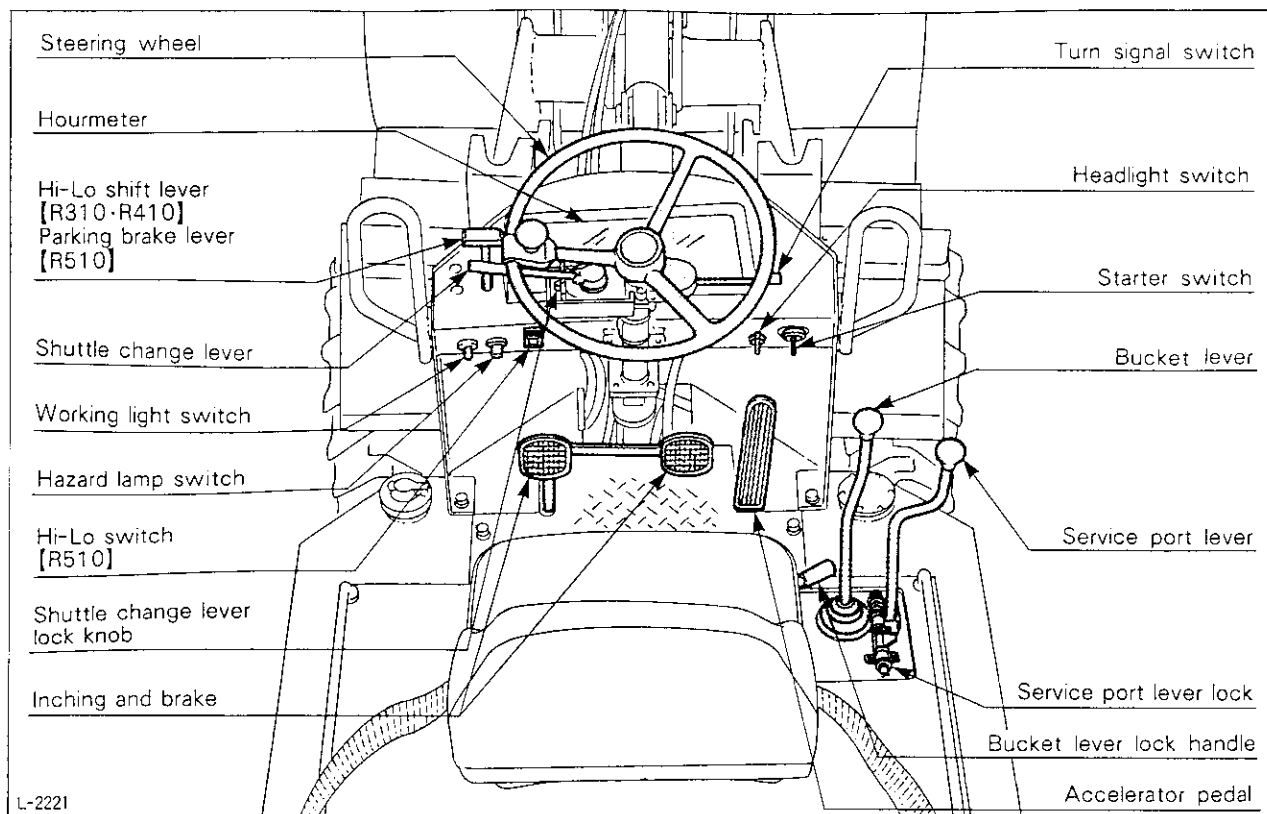
- When dismantling the machine or when servicing or hauling, be sure to apply the parking brake.

IMPORTANT:

- Do not attempt to move the machine when the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) is in parking ② position.



2.2 GAUGES



■ Start Switch (Key Stop System)

- "OFF (○)" position
With the starter switch in the "OFF (○)" position, all the electrical systems are shut off, the key can be inserted.
- "ON (◎)" position
When the key is turned one notch clockwise to "ON (◎)" from "OFF (○)" position, all the circuits are activated.
- "START" position
Turn the key another notch clockwise to "START" and the starter motor starts the engine. Once the engine has started, release the key, and it will return to "ON (◎)" by itself.
- "PREHEAT" position
When the key is turned one notch counterclockwise from the "OFF (○)" position, electric current flows through the glow lamp circuit for preheating. When the key is released in this position, it will return to the "OFF (○)" position by itself.



WARNING

To avoid personal injury:

- (1) Do not start the engine by shorting across starter terminals.
- (2) Start the engine only from the operator's seat, or the machine can run away and result in personal injury.

- (3) When parking or leaving the machine, stop the engine, set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking **P** position, lower the bucket and attachment to the ground, lock all control levers in neutral, and remove the key.
- (4) Do not turn off the starter switch while traveling, or the electric circuit will be damaged.

It is also because, if turning off the switch, the machine stops abruptly.

NOTES:

- (1) This machine uses a safety key start system, the engine can start only when the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) is at the parking **P** position.
- (2) This machine uses the key stop system. To stop the engine, drop the engine speed and turn the key to the "OFF (O)" position.

■ Hourmeter

◆ Integrating time counter

This counter indicates the time the engine has run at the rated rpm. The white-framed figure should be multiplied by 6 to obtain the running time in minutes.
e.g. 0170 (1)...170 hours. 6 minutes

◆ Engine tachometer

Indicates engine speeds.

▲ Fuel Gauge

Fuel level meter indicates the remaining fuel.

IMPORTANT:

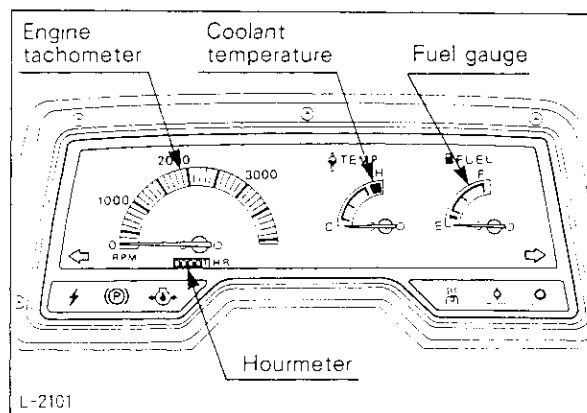
- Refuel before the meter points to the E mark.
If the fuel system is allowed to go empty, airbleeding will be necessary.

■ Coolant Temperature

With the starter switch in the "ON (●)" position, it indicates engine coolant temperature. The symbol C stands for cool and the symbol H, hot.

IMPORTANT:

- (1) When the pointer deflects across the bold line on the side of the H range, immediately stop the engine and check the following:
 - ① lack or leaking of coolant.
 - ② fan belt tension.
 - ③ mud and dirt deposits between the radiator fins.
- (2) When the engine overheats.
 - ① Stop the operation.
 - ② Idle the engine for about 5 minutes.
 - ③ Stop the engine and check.





L-2102

■ Easy Checker TM



Battery charge lamp

This lamp lights up when turning the starter switch to the "ON (⊙)" position and goes off when the engine has started.



Parking brake warning lamp

This lamp lights up when the parking brake is applied.



Engine oil pressure alarm lamp

This lamp lights up if the engine oil is circulating abnormally. This lamp lights up with the starter switch in the "ON (⊙)" position and it is put out as soon as the engine starts. If the lamp stays on after the engine has started, check the engine lubricant level.



Glow lamp

This lamp lights for five seconds since the starter switch is turned to the "PREHEAT" position, or from "ON (⊙)" to "START".



LST oil temperature alarm lamp

This lamp lights up when the oil temperature becomes out of the range.

Once the lamp lights up, stop working and wait while idling the engine until it goes off.



LST filter alarm lamp

This lamp lights up when the LST filter clogs or when LST charge pressure comes low.

In that case, replace the filter.

This lamp goes on when the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) is set at the parking (P) position.

It is out of order if the lamp still lights during running after the parking brake is canceled.

◆ Lamps' actuation

Lamps and simultaneously light up when the starter switch is turned on, and go off when the engine has started.



This lamp lights up only when LST oil temperature becomes too high.



This lamp goes on if the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) is set to the parking (P) position when the engine is running or stopping.

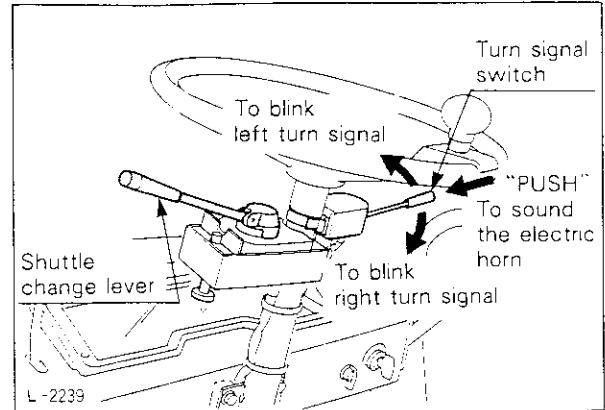
It goes off if the parking brake is canceled when the engine is running.

IMPORTANT:

- Carry out routine checks sufficiently.
It is not enough to perform checks with easy checker only.

■ Turn Signal Switch

Operate the turn signal switch to the right or left according to the direction in which the machine is to be turned. The corresponding turn signal will blink. Be sure to return the switch to the center position after the turn.



■ Headlight Switch

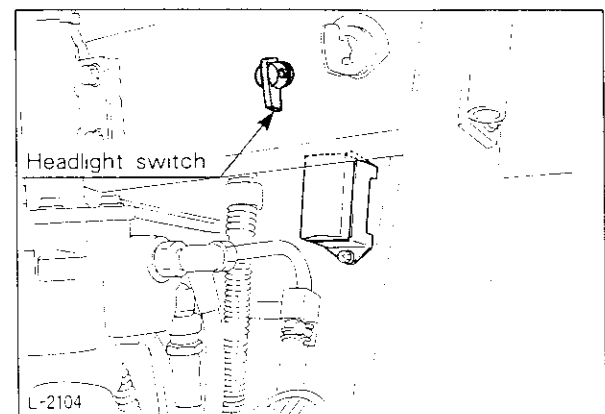
With the starter switch in the "ON" position, turn the headlight switch clockwise by one step for the dash light. Turn it one more step for the headlights.



CAUTION

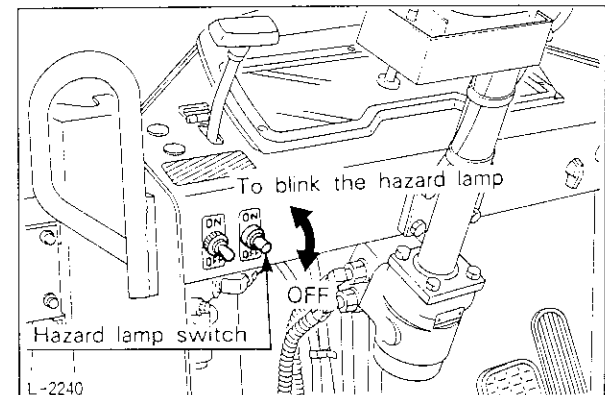
To avoid personal injury:

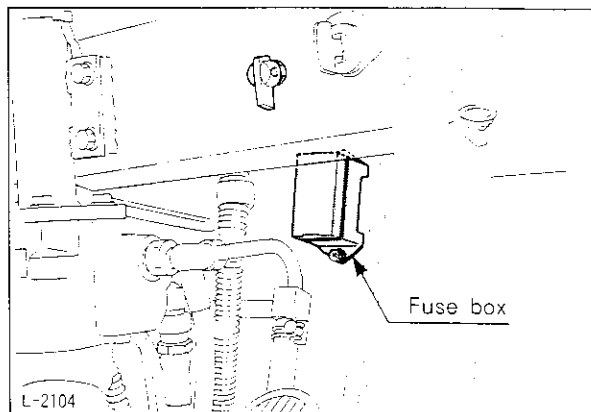
- For night operation, keep all machine mounted lights operating. Check for burned out lights and replace immediately.



■ Hazard Lamp Switch

Turn the hazard lamp switch up and the hazard lamps blink.

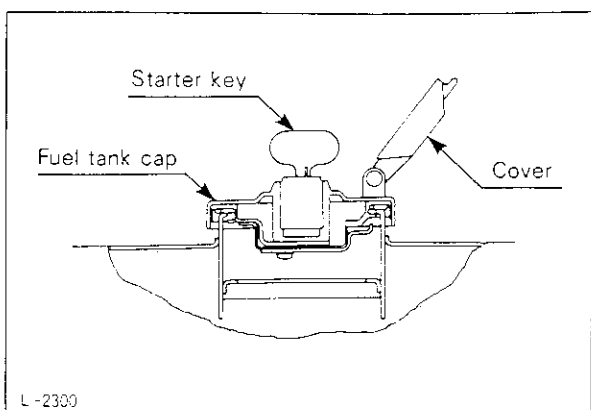




■ Fuse Box

The fuse box is for protection of the electrical circuit. There are four 10 ampere fuses and two 15 ampere fuses in the fuse box.

There are also extra fuses provided.



■ Opening/Closing of Fuel Tank Cap

- (1) Be sure to open or close the fuel tank cap with starter switch key. Insert the key into the slot in the cap and turn it counterclockwise to open it.
- (2) Be sure to close the cap and the cover to prevent rain from entering the tank.



WARNING

To avoid personal injury:

- Always stop the engine before refueling. Keep away from sparks and flames while refueling.

IMPORTANT:

- (1) Avoid spills and overfilling the fuel tank.
- (2) Keep first aid kit and fire extinguisher near by at all times.

2.3 CONTROL LEVERS AND PEDALS

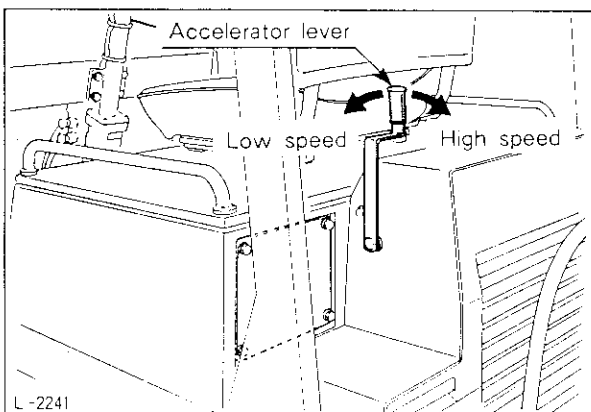
■ Accelerator Lever [Rear PTO type]

This lever controls engine rpm.

Sit in the operator's seat, push the accelerator lever back, and the rpm of the engine will increase.

Accelerator lever can be set at any position.

Place the accelerator lever at low-speed (forward) position when stopping the engine.



CAUTION

To avoid personal injury:

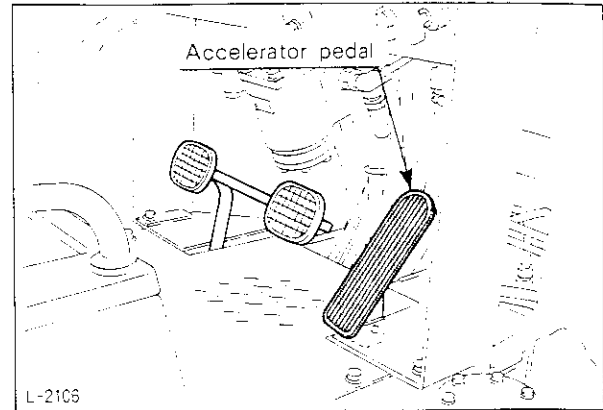
- The accelerator lever is interlocked with the accelerator pedal. Therefore, if the lever is held at a rear-side position, the engine speed cannot decrease below the level set by the lever even when releasing the accelerator pedal.

■ Accelerator Pedal

This pedal controls engine rpm. This pedal is interlocked with the accelerator lever. The more the pedal is pressed, the greater the engine rpm.

NOTES:

- (1) When the pedal is released, the engine speed will drop to the level preset on the accelerator lever.
- (2) The engine rpm suitable for starting the machine on a plain ground is about 1,000 to 1,200 rpm, though depending on the situations; i.e. ground condition, weather, etc.
Press the accelerator pedal gradually when starting the machine.

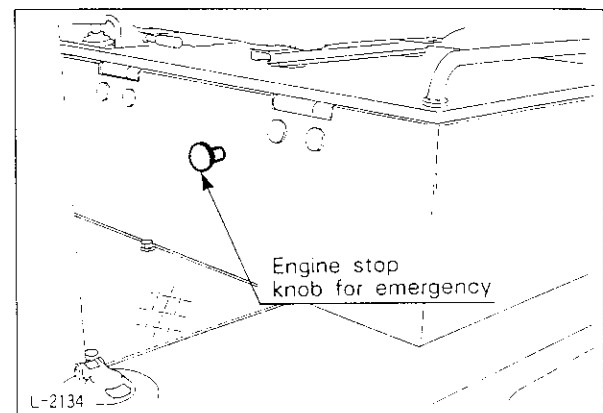


■ Engine Stop Knob for Emergency [R410-R510]

This machine uses the key stop system. To stop the engine, drop the engine speed and then turn the key to the "OFF (O)" position.

IMPORTANT:

- If the engine does not stop when turning the key to the "OFF (O)" position, pull the stop knob.
When restarting, make sure the stop knob is pushed in.



■ Inching and Brake Pedals

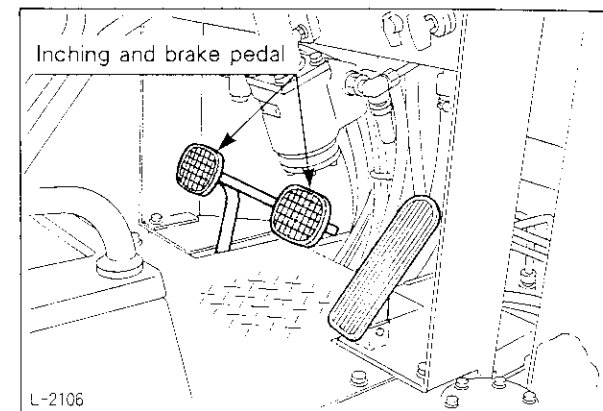
The inching and brake pedal are interlocked with each other.

The brake functions in the same way when either is pressed down.

Press either pedal down slightly, then the LST pump comes in neutral and cuts off the engine power on the way of transmission, that is so-called dynamic brake, particular to LST (Load Sensing Transmission).

When pressing it further, the disc brake acts together to obtain strong braking effect.

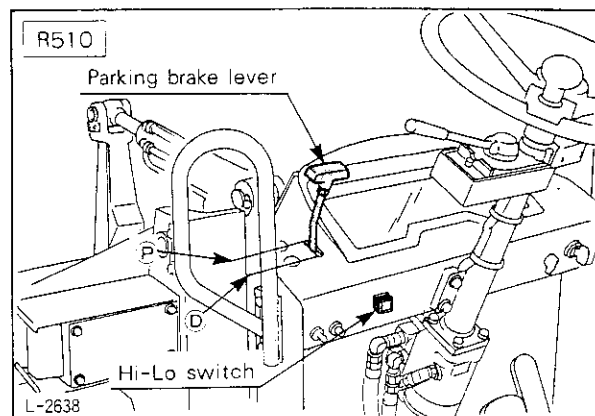
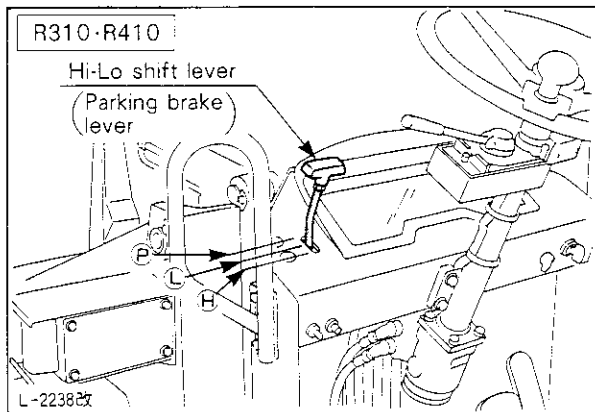
For the details of inching and brake pedal, refer to the section 3.8 "How to use the inching pedal" (Page 39)



WARNING

To avoid personal injury:

- When traveling with the bucket fully loaded, do not press the inching and brake pedal all the way down. Or the machine will brake abruptly.



■ Hi-Lo Shift Lever (Parking Brake) [R310-R410], Hi-Lo Switch and Parking Brake Lever [R510]

◆ R310-R410

This lever is the combination lever for shift-change and for parking brake.

The lever has the following three positions.

- Ⓟ: Push the lever all the way forward, the parking brake is applied and the parking brake warning lamp lights up.
- Ⓛ: This speed position is for bucket operation such as digging, shoveling or loading.
- ⓗ: This speed position is for traveling or for snow-removal.

◆ R510

● Hi-Low switch

- ⓗ: When the switch is pressed, the lamp lights up and the high speed range is engaged. This range is suitable for travel on flat terrain, or for light-duty work, such as snow clearing.
- Ⓛ: Another press of the switch causes the lamp to go out, and engages the low speed range. This is the range for use in such operations as loading.

● Parking brake lever

- Ⓟ: When the lever is pushed all the way to the front, the parking brake is applied, and the warning lamp lights up on the panel.
- Ⓢ: The parking brake is released, and the warning lamp goes out.



WARNING

To avoid personal injury:

- (1) While descending a slope, be extremely careful when braking or shifting. Especially when shifting from the high ⓗ to low Ⓛ, there is the risk of the machine rear lifting which is very dangerous.
- (2) When descending down a long slope, use the engine brake to slow the machine.
(Run the engine at a relatively high speed and select the low speed Ⓛ position.)



CAUTION

To avoid personal injury:

- Make sure that the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) is at the parking Ⓟ position before starting the engine.
To prevent the machine from starting suddenly and unexpectedly, the safety key start system is provided.
The engine can start only when the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) is at the parking Ⓟ position.

■ Shuttle Change Lever

This lever is used for changing the machine's running direction, forward or back.

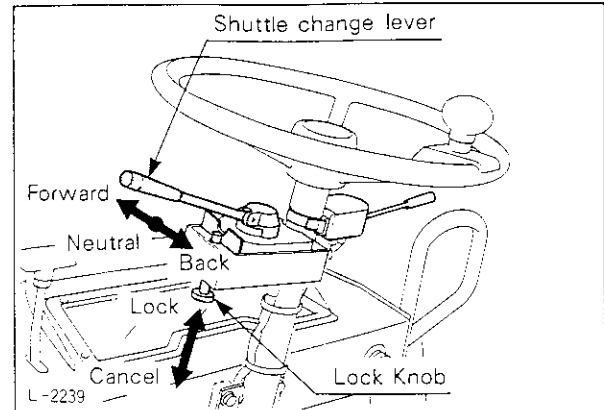
Pull the lock knob down to cancel the shuttle change lever lock and push the shuttle change lever forward for forward direction and pull it back for reverse direction.



WARNING

To avoid personal injury:

- To prevent the machine from moving suddenly or unexpectedly, be sure and push the lock knob up to lock the shuttle change lever whenever getting on or off.



■ Bucket Lever

A single lever controls all bucket and lift arm operations.

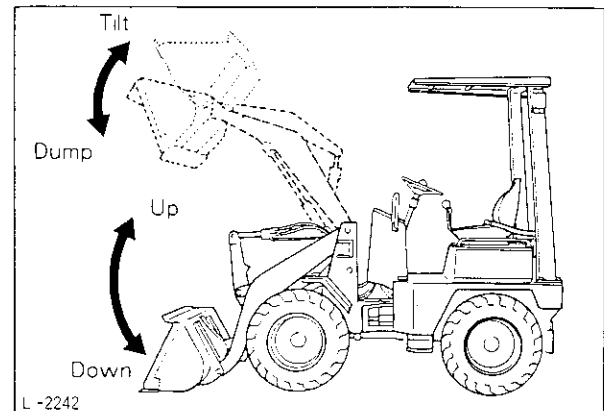
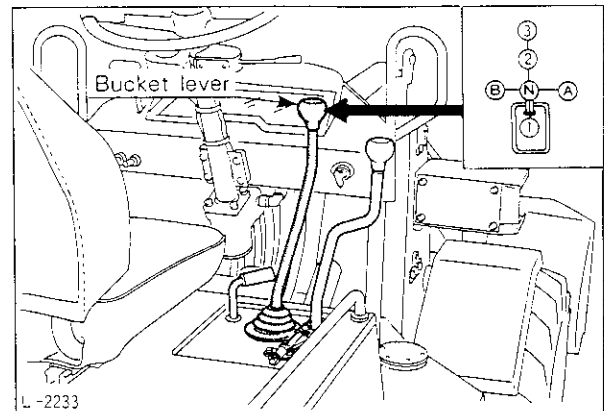
- ① Lift arm up
- Ⓝ Hold (neutral)
- ② Lift arm down
- ③ Floating
- Ⓐ Bucket dump
- Ⓑ Bucket tilt



CAUTION

To avoid personal injury:

- Do not use float position to lower the bucket and attachment. The bucket and attachment will lower in response to control lever movement even when the engine is off.



■ Bucket Lever Lock Handle

This handle is used to lock the bucket lever.

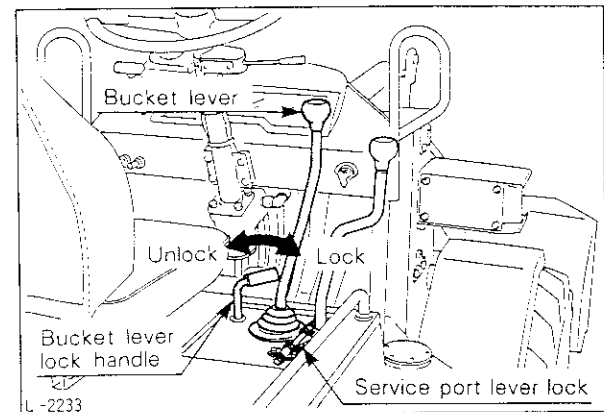
With the bucket lever in neutral, move the lever all the way to the right. The bucket lever is then locked.

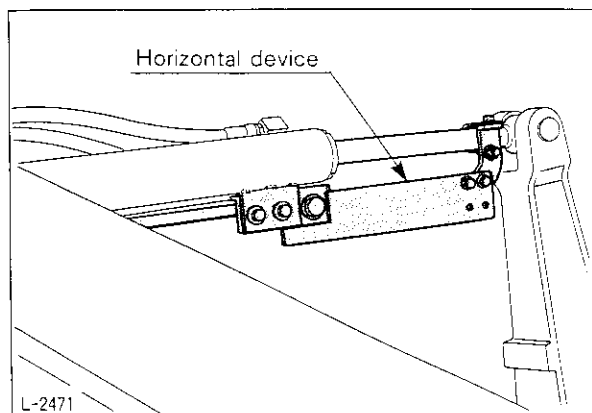


WARNING

To avoid personal injury:

- When dismounting or servicing the machine, be sure to lower the bucket to the ground and lock the bucket lever with the bucket lever lock handle.

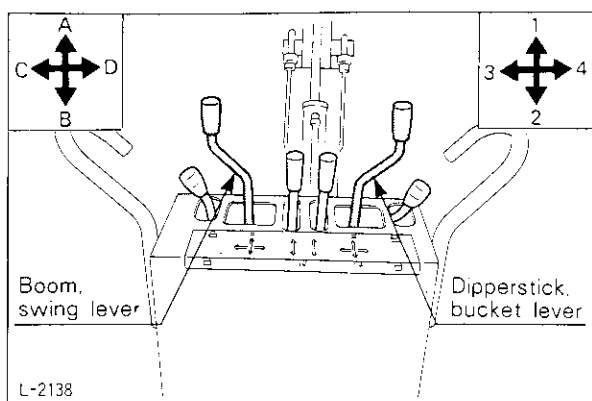




■ How to Use the Horizontal Device

When the bucket lever is moved to the tilt position with the bucket in the dump position, the bucket lever will be automatically held at the tilt position, and the bucket will continue to tilt. When the bucket achieves a position that will make the bucket horizontal when the bucket is lowered on the ground, the bucket lever will automatically move to the neutral position. When the arms are lowered under this condition, the bucket will horizontally lower onto the ground.

The bucket lever can be operated even when automatically held at the tilt position.

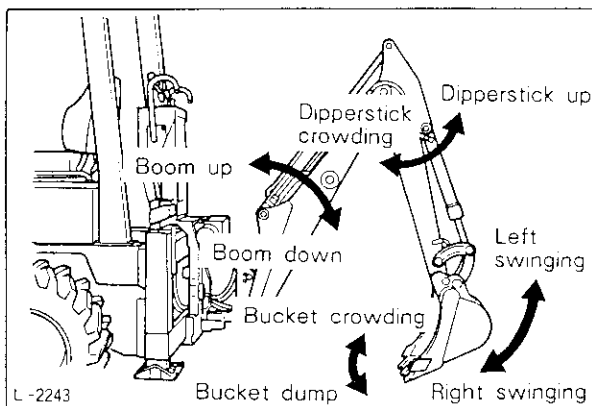


2.4 BACKHOE OPERATING LEVER

■ Backhoe Operating Lever

Position of lever

- | | |
|-------------------------|----------------------------|
| 1. Dipperstick up | } Dipperstick bucket lever |
| 2. Dipperstick crowding | |
| 3. Bucket crowding | |
| 4. Bucket dump | |
| A. Boom down | } Boom, swinging lever |
| B. Boom up | |
| C. Left swinging | |
| D. Right swinging | |



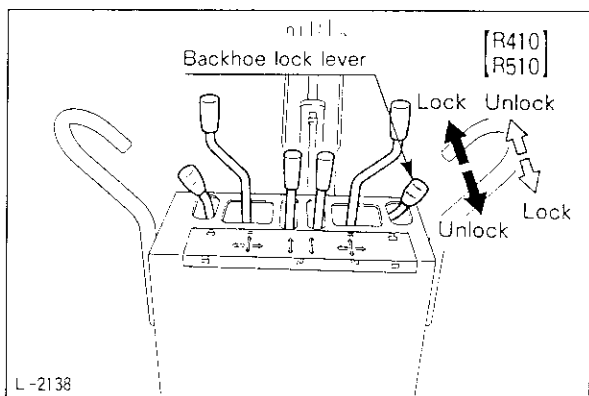
■ Backhoe Lock Lever

The backhoe operating lever is locked when setting it in neutral and then pushing the backhoe lock lever out.

[R310]

The backhoe operating lever is locked when setting it in neutral and then pulling the backhoe lock lever.

[R410-R510]



WARNING

To avoid personal injury:

- (1) When dismantling the machine, lower the backhoe to the ground. And lock the operating levers with the backhoe lock lever.
- (2) Pay attention to the backhoe lock lever operating direction. Check your machine's type for correct operating direction.

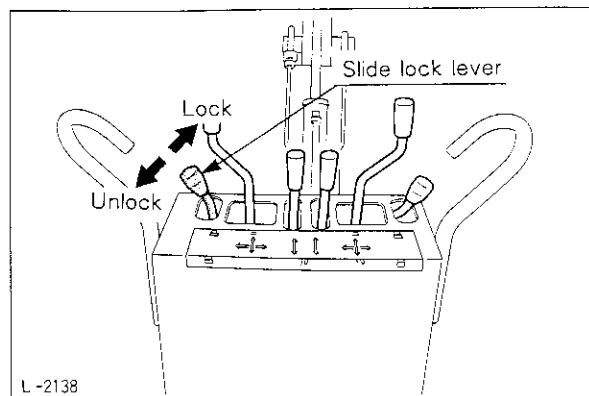
■ Slide Lock Lever

The slide lock is used to slide the backhoe to the right or left.

Pushing the lever forward activates the hydraulic pressure to lock the slide frame and the slide bracket.

Pulling the lever rearward releases the hydraulic lock.

For correct backhoe operating procedure, refer to 3.11 "BACKHOE WORK", "Sliding the Backhoe" (Page 48).



■ Outrigger Lever

Position of lever

A: Left outrigger.....down

B: Left outrigger.....up

C: Right outrigger.....down

D: Right outrigger.....up

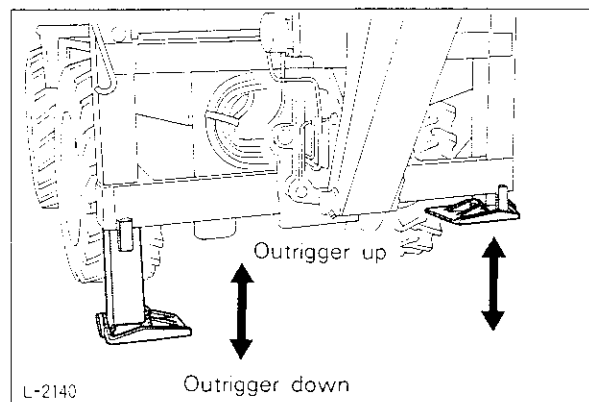
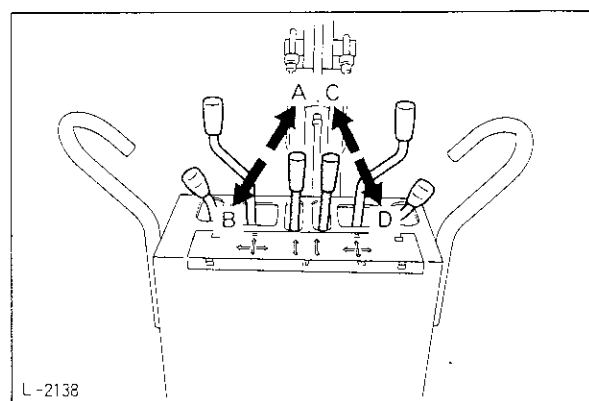


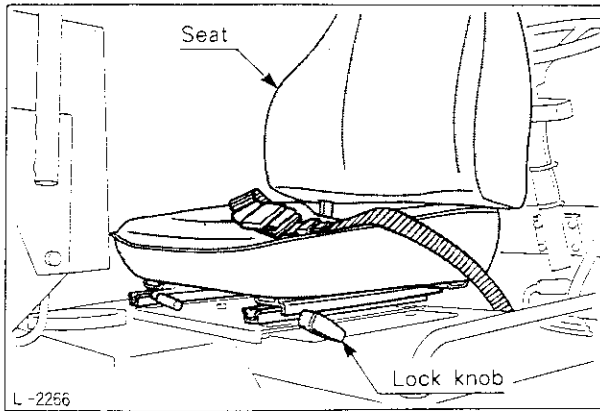
CAUTION

To avoid personal injury:

- When working with a backhoe, lower the outrigger floats and the shovel bucket to stabilize the machine. Working with a backhoe without lowering the outrigger floats will cause the machine to incline or move back and forth. This can be dangerous.

To move the machine when working with a backhoe, lift the outrigger floats and the shovel bucket above the ground so that they will not be hit by the ground or other obstacles.





■ Seat Adjustment

When working with a backhoe, change the seat position accordingly.

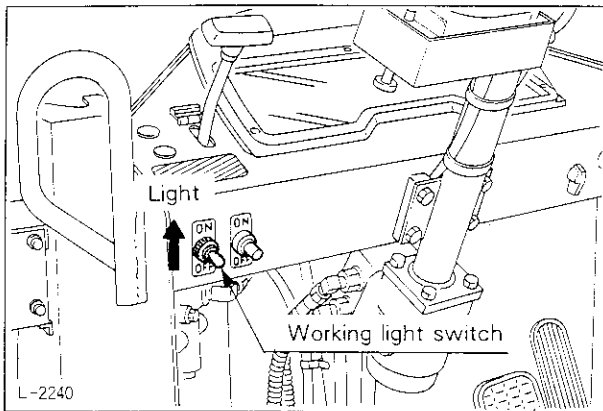
- (1) Pull the lock knob up to release the lock.
- (2) Turn the seat counterclockwise by 180°. (Push and release it on the way, it will stop at the fixed position and lock by itself.)
- (3) When restoring the seat for traveling, cancel the lock in the same way and turn the seat clockwise just as the above.



CAUTION

To avoid personal injury:

- After changing the seat position, check that the seat is securely locked before you sit down.



■ Working Light Switch

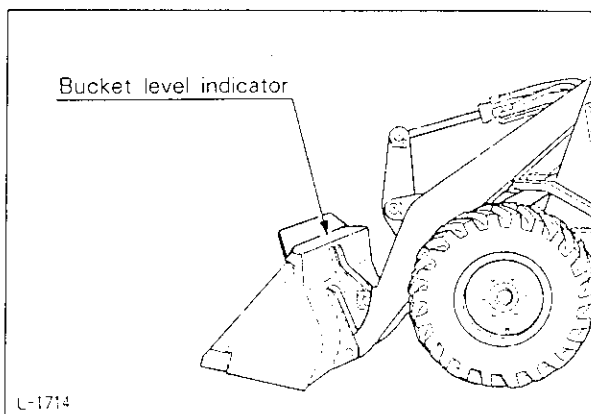
To turn on the light, turn on the starter switch and place the work light switch up to the "ON" position.

NOTE:

- The machine without backhoe is not equipped with a working light.

2.5 BUCKET LEVEL INDICATOR

Since the bucket leveler covers almost the entire width of the bucket, you can check the bucket's condition from the side, the center or any other angle even while working.



2.6 HOOD AND SEAT

■ Opening and Closing the Hood Covers

◆ Top hood cover

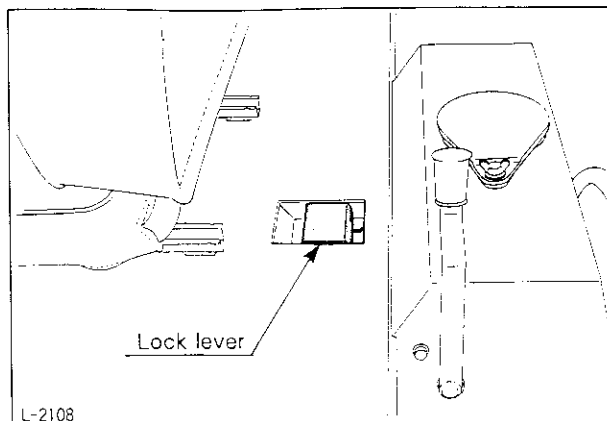
- (1) Pull up the lock lever of top hood cover, then lift the backrest of the seat, and the top cover will open.

To keep the top hood cover open, insert the support rod at the left of the hood into the rod hole in the cover. [R310-R410]

When the hood cover is opened completely, it will be automatically held by spring. [R510]

- (2) Restore the support rod securely, shut down the cover, so that it is automatically locked. [R310-R410]

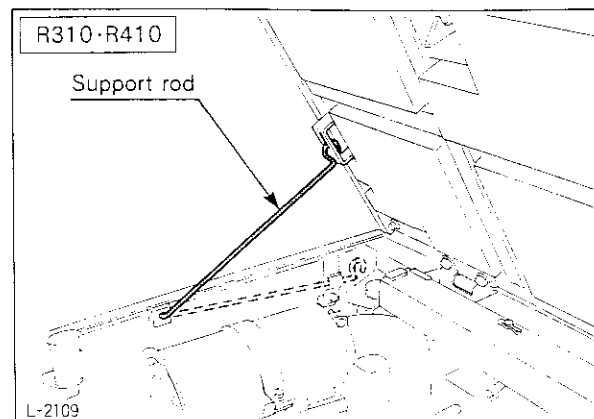
Simply shutting and pressing down the hood cover is all that is needed to automatically lock it. [R510]



CAUTION

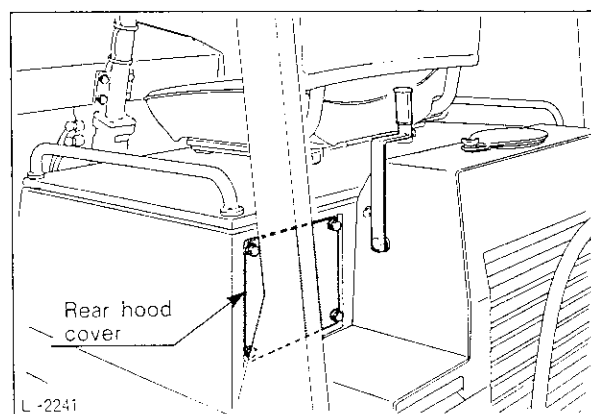
To avoid personal injury:

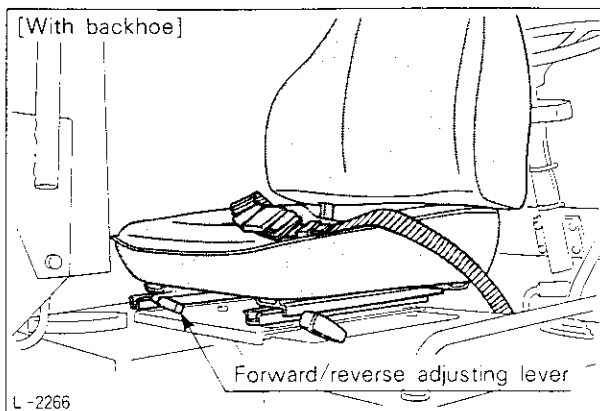
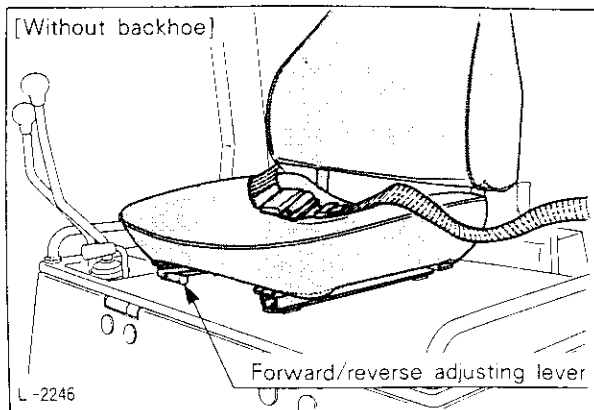
- When servicing or checking under the hood, make sure that the top hood cover is secured with a support rod if the cover is open. [R310-R410]



◆ Rear hood cover [R310-R410]

This cover is to be opened when replacing air cleaner element.





■ Driver's Seat Adjusting Levers

To adjust, lift the adjusting lever up and unlock the stopper, then slide the driver's seat to the desired position.



CAUTION

To avoid personal injury:

- Ensure the seat is secured after adjusting.

3. OPERATING THE MACHINE



CAUTION

To avoid personal injury:

- (1) Before operation, read "For Safe Operation" in the front of this manual.
- (2) Pay special attention to the "DANGER", "WARNING" and "CAUTION" labels found on the machine.


3.1 HOW TO USE A NEW MACHINE

A new machine has been carefully tested and inspected, and various adjustments have been made in the factory.


However, you can say that the machine is the same as a newly born baby as the machine should be handled with the greatest care during the first 100 hours.

The life of the machine is greatly affected by how the machine has been used during the initial 100 hours.

3.2 CHECKS BEFORE OPERATING MACHINE

- (1) Before starting the machine, make daily routine maintenance and service checks.
- (2) Make sure that there are no bystanders around the machine.
- (3) Make sure that the shuttle change lever is in neutral, that the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) is set at the parking  position and that the bucket lever is locked with the lock handle in neutral.
- (4) Make sure that the engine stop knob is pushed in completely.
- (5) Make sure that the bucket is on the ground.
- (6) Sit on the seat in the normal driving posture and adjust the seat for proper reach to the pedals and levers.

IMPORTANT:

- The engine can start only when the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) is at the parking  position. In any other position, the safety key start system works to prevent the machine from starting suddenly or unexpectedly.

3.3 STARTING THE ENGINE

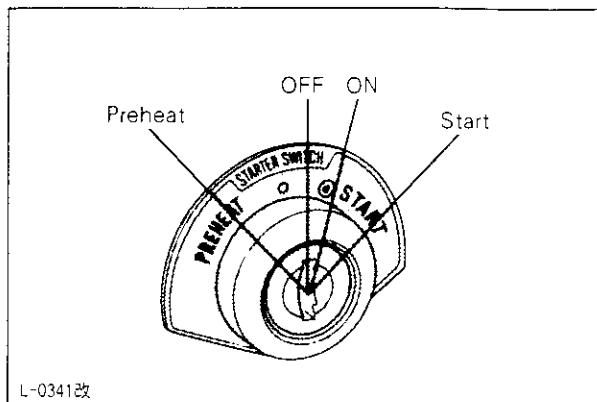


WARNING

To avoid personal injury:

- Do not operate or idle engine in a non-ventilated area.

Carbon monoxide gas is colorless, odorless and deadly.



- (1) Insert the key into the starter switch.
- (2) Press the accelerator pedal slightly.
- (3) Turn the starter switch to "PREHEAT" and preheat the engine until the preheat lamp goes off, for approx. 5 seconds. [Super glow plug type]
- (4) Turn the key to the "START" position.
- (5) Once the engine has started, release the key and it will return to the "ON" position.

NOTE:

- Before starting the engine, make sure that the shuttle change lever is in neutral.

IMPORTANT:

- (1) Never turn the key from "ON" to "START" while the engine is running, or the starter motor may be damaged.
- (2) If the engine fails to start, wait at least 20 seconds before restarting. Do not keep the starter motor on for more than 10 seconds, or it may be burnt out or the battery may discharge.
- (3) After starting the engine, allow it to warm up for 5 minutes.

3.4 STARTING THE ENGINE IN COLD WEATHER

- (1) Push the accelerator pedal completely down.
- (2) Turn the starter switch counterclockwise to preheat the engine, and hold it about 10 more seconds after the preheat lamp has gone off. [Super glow plug type]
- (3) Turn the key to the "START" position.
- (4) Once the engine has started, release your fingers from the key, and it will automatically return to the "ON" position.
- (5) As the engine rpm increases, gradually release the accelerator pedal. Warm up the engine for at least 5 minutes.

IMPORTANT:

- Do not use the self-starting motor continuously for more than 30 seconds.

3.5 CHECKS IMMEDIATELY AFTER ENGINE START

- (1) If the engine or hydraulic oil is cold, the machine will not work at its best. When warming up the engine, do not quickly accelerate the engine.
- (2) Once the engine has been warmed up, check to see
 - that the engine lubricant pressure alarm lamp is off.
 - that the battery charge lamp goes off when engine speed is increased.
 - that the color of exhaust is normal, and no unusual noise or vibrations are observed.
 - that no lubricant, fuel or water is leaking, and
 - that LST filter warning lamp goes off after moving the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) from the parking **P** position to the low **L** position (R310-R410) or to the drive **D** position (R510).

◆ If one of the following should be found, immediately stop the engine.

- Engine speed suddenly decreases or increases.
- Sudden, abnormal noise is heard.
- Color of exhaust is dark.
- The engine lubricant pressure alarm lamp lights up during operation.
- LST filter warning lamp lights up during operation.

IMPORTANT:

- Check and maintain the machine, following the directions from your Kubota dealer.

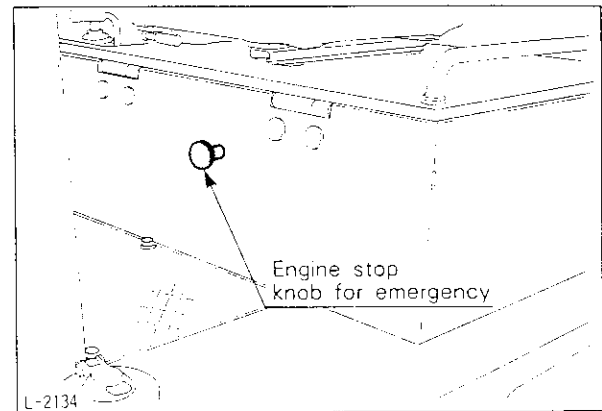
3.6 STOPPING THE ENGINE

To stop the engine, idle the engine for about five minutes to allow it to cool.

- (1) By turning the key to the "OFF (○)" position, the engine stops.
- (2) Slowly operate the bucket control levers to place the bucket on the ground.

IMPORTANT:

- (1) If the engine does not stop when turning the key to the "OFF (○)" position, pull the stop knob. [R410-R510]
- (2) Do not stop the engine before it cools sufficiently, or the service life of the engine parts may be shortened.
- (3) If the engine overheats, do not stop it immediately but cool it gradually by running it at medium speed before stopping it.



WARNING

To avoid personal injury:

- When dismantling the machine, stop the engine, set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking **P** position, lower the bucket and attachment to the ground, lock all control levers in neutral, and remove the key.

3.7 TRAVELING

■ Starting

- (1) Release the lock handle for the bucket lever.
- (2) Slightly press the accelerator pedal to increase the engine rpms.
- (3) Move the bucket lever to lift the bucket about 40 cm (1' 3/4") above the ground and set it in the proper posture for travel.
- (4) Move the Hi-Lo shift lever from the parking P position to the low L position. [R310-R410]
Move the parking brake lever from the parking P position to the drive D position and set the Hi-Lo switch to the low L position. [R510]
- (5) Set the shuttle change lever to the desired position, gradually increase the engine rpms by pressing the accelerator pedal and the machine will move.



WARNING

To avoid personal injury:

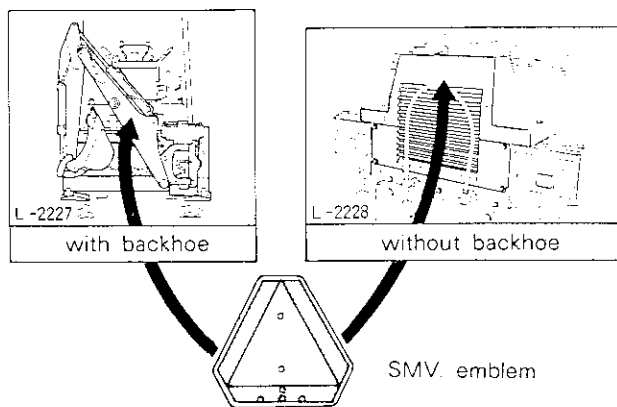
- (1) Fasten seat belt before operating the machine.
- (2) When transporting a load, keep the loader bucket as low as possible to avoid tip over.
Be extra careful when working on inclines.
- (3) Before operating, check operating area. Make sure no bystanders are near the machine. Honk the horn before moving.



CAUTION

To avoid personal injury:

- (1) Before traveling on the public road, observe all local and state traffic regulations. Use SMV emblem and warning flashers as required.
- (2) To start the machine on a slope, set the Hi-Lo shift lever (R310-R410) or the Hi-Lo switch (R510) to the low L position and press the accelerator pedal gradually while releasing the inching pedal so that the machine does not move backwards.
- (3) Immediately after starting, check that the brake and the steering wheel work normally.
- (4) If a tire has blown, the machine may slip or turnover. To avoid turnover, do not brake or steer hard, brake slowly to stop the machine gradually.



■ Shifting Hi-Lo Shift Lever [R310·R410] or Hi-Lo Switch [R510] to Change Speed

Hi-Lo shift change and reversing operation can be done simply by moving the Hi-Lo shift lever (R310·R410) or the Hi-Lo switch (R510) or the shuttle change lever to the desired position without stopping the machine.



WARNING

To avoid personal injury:

- (1) While descending a slope in the high-speed H position, be extremely careful when braking or shifting. Especially when shifting from the high H to the low L position, there is the risk of the machine rear lifting which could be dangerous.
- (2) When descending a slope, use the engine brake to slow the machine. (Run the engine at a relatively high RPM and select the low-speed L position.)

■ Turning

To steer the machine to either side, turn the steering wheel in the intended direction.

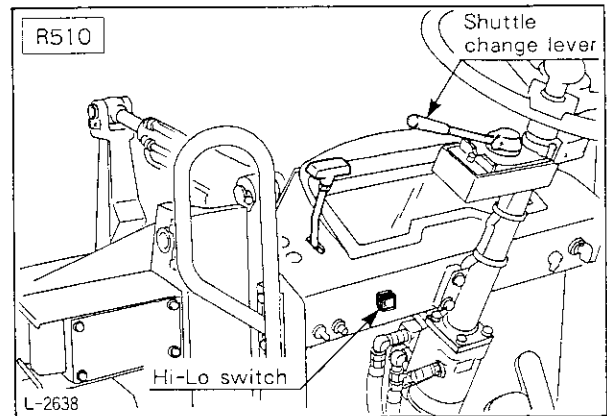
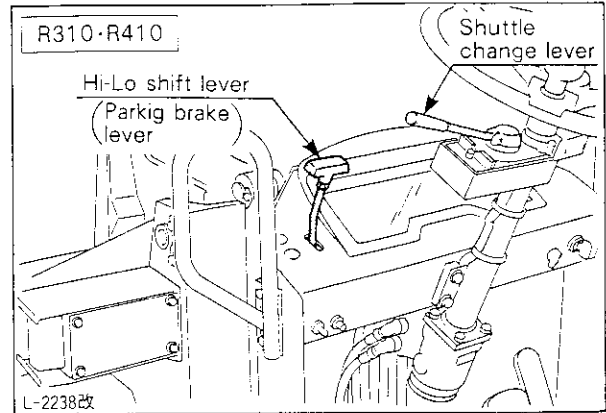
- (1) The front and rear frames of this machine bend at the center pin (the pin connecting the two frames) so that when the machine turns, the rear wheels follow the tracks of the front wheels.
- (2) Rotate the steering wheel to follow the turn of the machine. When turning fully, never attempt to rotate the steering wheel once it reaches its stroke end.



WARNING

To avoid personal injury:

- (1) Do not turn sharply at high speeds. It is dangerous. In the worst possible case, the machine may turn over.
- (2) The steering wheel for this machine will not return of itself to the straight ahead position after turning. Be sure to return the wheel to the straight ahead position.
- (3) Steering lose will result if the engine is stopped during travel.
Do not stop the engine during travel.



■ Deceleration on a Slope



WARNING

To avoid personal injury:

- (1) Going up or down a slope diagonally is dangerous as the machine may skid. Always drive or operate straight up or down a slope, or the machine may slip side ways and tip over.
- (2) Use foot brake together with engine brake if the engine tends to over-run when descending a slope.



CAUTION

To avoid personal injury:

- (1) If the engine should stall on a slope, set the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) to the parking **P** position immediately for safety purpose, although the disc brake is automatically applied.
Then set the shuttle change lever to the neutral position to prepare for the next start.
- (2) When descending down along slope, use engine brake. Using the foot brake alone accelerates brake pad wear and cause heat buildup and will result in poor brake performance.
- (3) Even shifting the Hi-Lo shift lever (R310·R410) or the Hi-Lo switch (R510) from the high **H** to the low **L** when climbing a slope (climbing angle: more than 15°), the machine may fail to gain enough power occasionally. In that case, release the accelerator pedal and then press it down again.

IMPORTANT:

- Before climbing a slope, set the Hi-Lo shift lever (R310·R410) or the Hi-Lo switch (R510) to the low **L** position so that the machine can climb to the top easily without shift-change. It is best to descend at the same speed you climbed.

■ Traveling on rough roads



WARNING

To avoid personal injury:

- Slow down when turning on rough uneven terrain and slopes to avoid tip over.

■ Traveling on Snow



WARNING

To avoid personal injury:

- There is the risk of the machine slipping excessively on frozen ground, install chains on the front wheels, for operation on snow, install chains on both front and rear wheels.

IMPORTANT:

- When traveling on snow, it is important to keep the wheels and their related parts in good condition. After traveling, be sure to remove all snow and ice from those parts.

■ Stopping

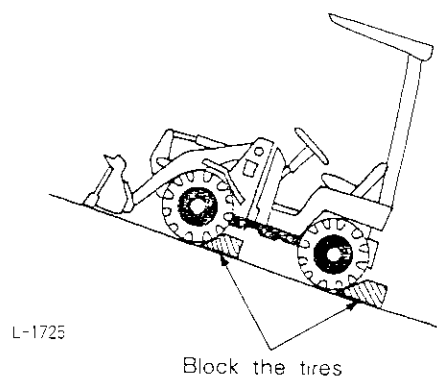
- (1) Remove the foot from the accelerator pedal and pull the accelerator lever forward.
- (2) Depress the brake pedal and stop the machine.
- (3) Set the shuttle change lever to the neutral position.
- (4) Set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking \textcircled{P} position.
- (5) Lower the bucket on the ground.
- (6) Set the bucket lever lock handle in the lock position.



WARNING

To avoid personal injury:

- (1) Choose flat and level ground for parking the machine. It is important to lower the bucket to the ground.
If the machine must be parked on a slope, be sure to block the tires securely.
- (2) When dismantling the machine, stop the engine, set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking \textcircled{P} position lower the bucket to the ground and lock the control levers in neutral, and remove the key.



3.8 HOW TO USE THE INCHING PEDAL

■ Inching Pedal Operation

Operate the inching pedal as follows according to the application.

◆ To stop the machine

- (1) The inching pedal controls LST pump and brake.
- (2) To stop the machine completely during work, first press the pedal slightly. Oil flow from LST pump comes to zero and cuts the driving power to slow down or stop the machine.
- (3) Press the pedal completely.
The disc brake will be applied to stop the machine completely.

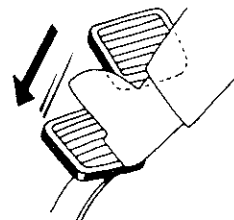
◆ To approach slowly

- (1) Press the inching pedal slightly while pressing the accelerator pedal. The machine approaches slowly.
- (2) The machine can slowly approach an object by accelerator pedal regulation only, without inching pedal operation.

◆ To scoop during digging

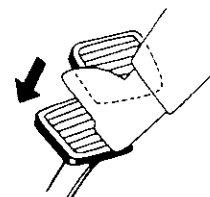
- (1) The inching pedal enables the machine to scoop repeatedly.
- (2) Press the pedal fully and return it quickly.
Repeat this operation, the machine scoops repeatedly.

Press the pedal with force



L-1297

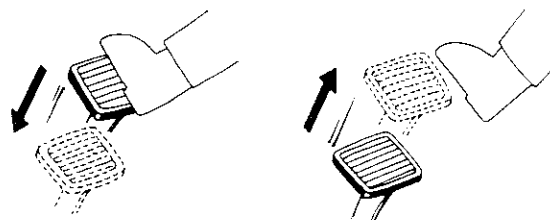
Press the pedal slightly



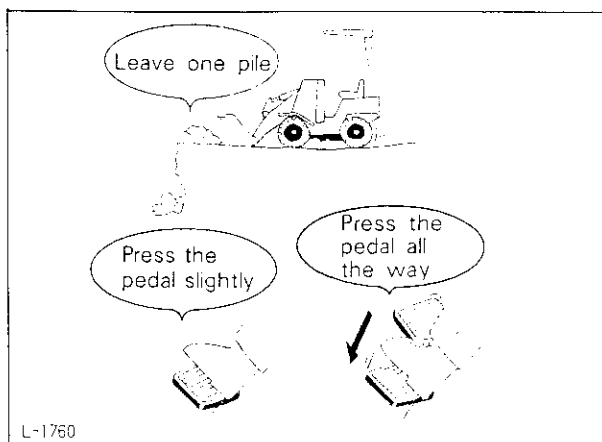
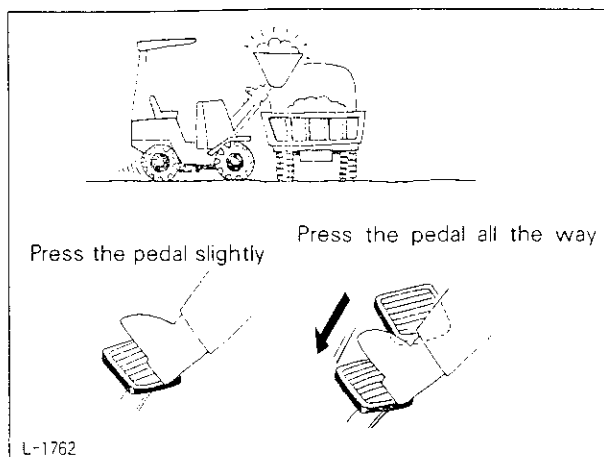
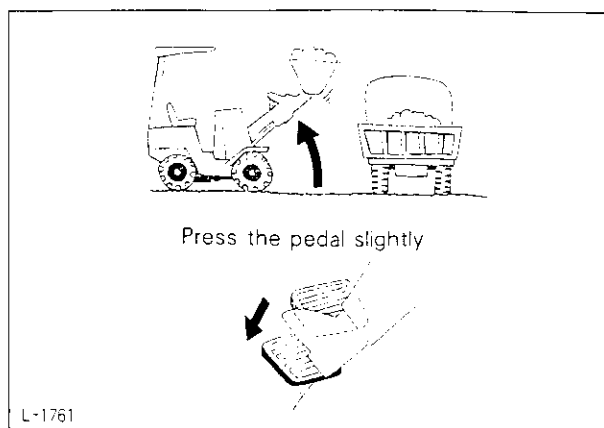
L-1297

Press the pedal fully

Release suddenly



L-1298



■ Use the Inching Pedal According to the Job.

◆ Loading

- (1) Press the inching pedal slightly while pressing the accelerator pedal to approach an object slowly. Slow approach can be done also by regulating accelerator pedal operation.
- (2) The bucket can be operated at the maximum engine rpm when the inching pedal is used to approach slowly. Bucket operation speed is thus maintained.

- (3) Press the inching pedal slightly to allow the machine to approach to the desired stop position. Then press the pedal all the way to stop the machine completely.

◆ Refilling

- (1) Press the inching pedal slightly to approach the desired stop position, then press the pedal all the way to stop the machine at the exact position.
- (2) The traveling speed automatically decreases to prevent engine stalling as the external load increases.
- (3) During traveling with bucket operation, the traveling speed abruptly increases at the time of dumping operation since the external load changes at that time.
- (4) Use inching pedal and concentrate the power to the attachment operation near holes or slopes.



WARNING

To avoid personal injury:

- When traveling with a fully-loaded bucket, do not press the inching pedal all the way. The machine will brake abruptly and cause dangerous loss of balance that may cause an accident.



3.9 TYPICAL JOBS USING A WHEEL LOADER

Below are some typical jobs performed using a wheel loader. The machine can also be used to perform other jobs by connection with various attachments.



WARNING

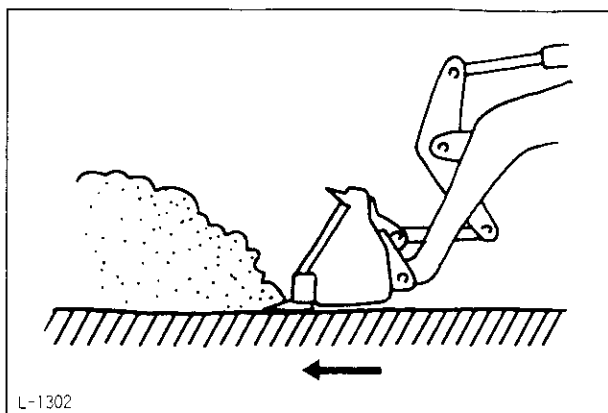
To avoid personal injury:

- (1) Fasten seat belt before operating the machine if the machine is equipped with ROPS.
- (2) When transporting a load, keep the loader bucket as low as possible to avoid tipping over.
Be extremely careful when working on inclines.
- (3) Unreasonable operation such as on dangerous terrain, beyond the load capacity or beyond the intended use of the machine must be avoided as it may cause the machine to tip over.
- (4) Be sure to place the Hi-Lo shift lever (R310-R410) or the Hi-Lo switch (R510) in the  position before entering ungraded terrain. If may tip over or slip.
- (5) Do not drive the machine close to the edges of ditches or banks which may collapse under the weight of the machine especially when the ground is loose or wet.
- (6) Operating on slopes can be dangerous, rain, snow, loose gravel, soft ground, etc., will change the ground conditions. Do not operate this machine in questionable ground conditions.
If you operate on a slope or ramp, always set the Hi-Lo shift lever (R310-R410) or the Hi-Lo switch (R510) to the low  position. The machine can go out of control and tip over if you do not follow these instructions.
- (7) Never perform digging or shoveling with the machine in the articulated condition.
- (8) Never dig or shovel at high speed.
Such operation can cause the machine to lose balance and its rear wheels to lift off the ground, which may in turn cause a serious accident.
- (9) To avoid possible machine tip over, do not operate the machine in any site whose terrain cannot be ascertained, such as ground covered with seeds or snow and check for hidden projections, dents, road shoulders, etc. beforehand, and take care not to approach them during work.
- (10) Be sure to ease up on the accelerator at the end of backfilling grooves, or areas at the edge of cliffs or pond banks, or at the end of an ascent: Upon removal of the external load, the machine speed will automatically increase, reduce speed to avoid entering grooves or tipping over.
- (11) To avoid machine slip or tipping over, do not operate the machine on ungraded or soft terrain, such as fill-up ground. Grade and compact the site beforehand at all times.

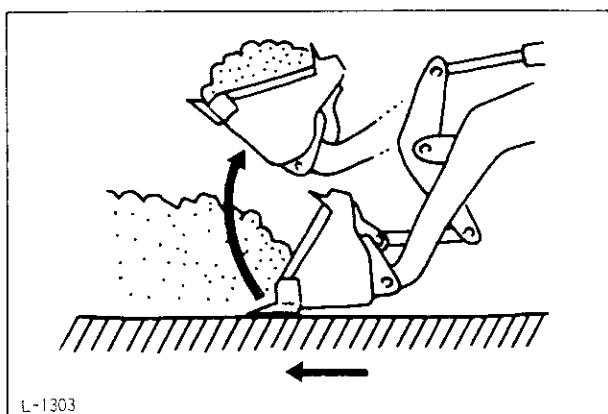
■ Digging and Loading

◆ Loading a sand pile

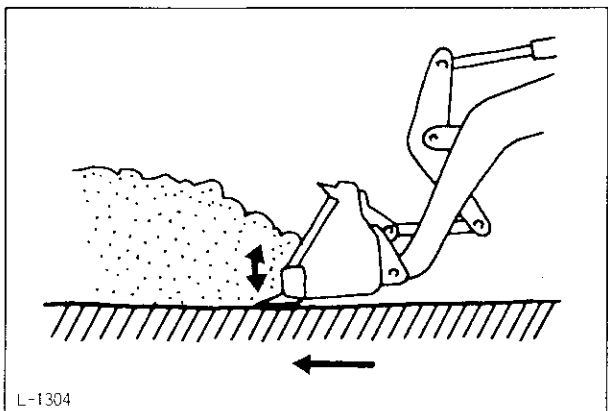
- (1) Direct the bucket blade parallel to the ground and advance the machine to drive the bucket into the sand pile.



- (2) When the bucket is sufficiently driven into the sand, lift the bucket while advancing the machine.

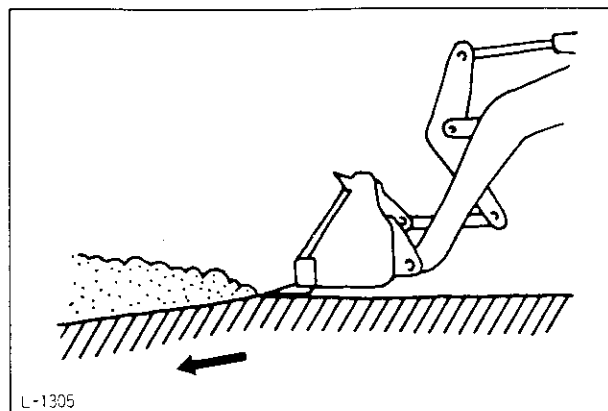


- (3) If the bucket is insufficiently driven into the sand, move the bucket blade up and down while moving forward.

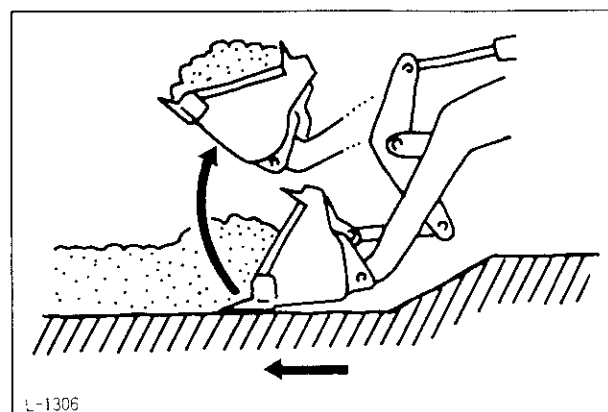


◆ Digging and loading from flat ground

- (1) Direct the bucket blade slightly downward and lower the bucket as you advance the machine. The recommended digging depth per pass is between 10 and 15 cm (4-6").

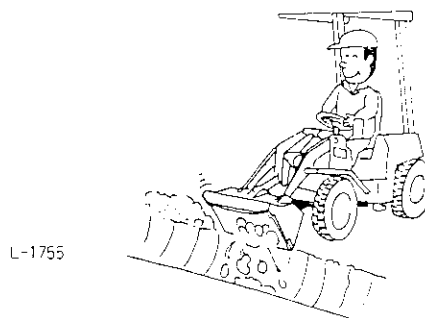


- (2) While adjusting the vertical movement of the bucket, lift the bucket so that sand can be removed by layers. Continue in this manner as you advance the machine.



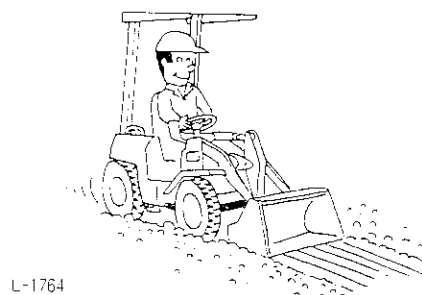
■ Refilling

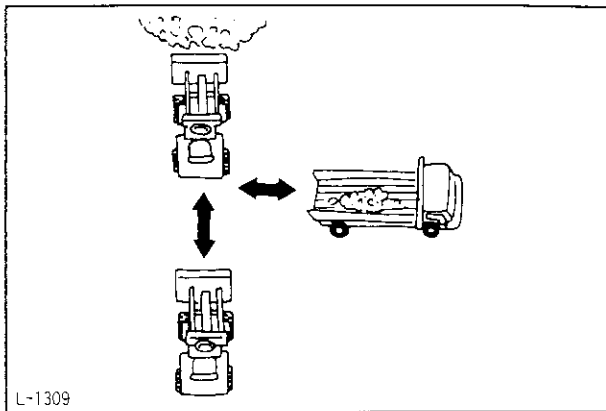
- (1) Direct the bucket horizontally and push the piled sand toward the ditch.
- (2) When the bucket reaches the ditch, dump the bucket to discharge the sand into the ditch.



■ Leveling Ground

- (1) Dump and tilt the bucket alternately to distribute the soil from the bucket over the ground as you move the machine backward.
- (2) Then, dump the bucket, lower the bucket and move the machine backward so that the blade scratches the ground surface.
- (3) Direct the bucket horizontally, set the lift arms in the "floating" position using the bucket lever and level the ground while backing the machine.



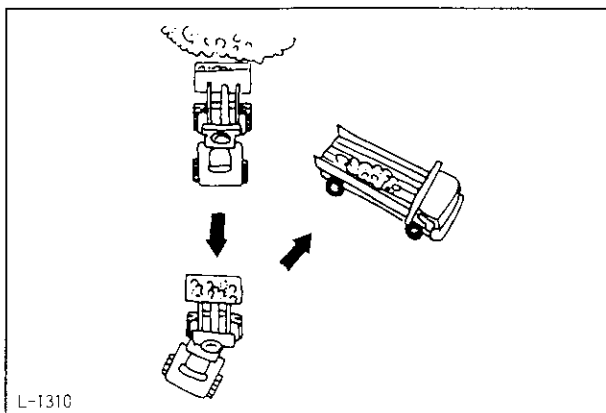


■ Loading onto a Truck

Examine the job site situation and choose the efficient loading method that minimizes the swivel angle and moving distance.

◆ Cross loading method

- (1) Position a truck perpendicular (90°) to the shoveling direction of the machine.
- (2) After digging and shoveling with the bucket, move the machine backward. Then drive the truck to a point between the machine and the piled sand. Then, load the sand onto the truck.
- (3) This method is the fastest and leads to the shortest cycle time.



◆ V-shift loading method

- (1) Position a truck at an angle of about 60° from the shoveling direction of the machine.
- (2) After digging and shoveling with the bucket, move the machine backward and turn the steering wheel to position the machine perpendicular (90°) to the truck. Then move the machine forward to load sand onto the truck.
- (3) A smaller angle between the machine and truck will provide a shorter cycle time and more efficient operation.

3.10 ATTACHING AND DETACHING THE FRONT ATTACHMENTS

[R310-R410]

This machine utilizes a multi-coupler for easy connection and disconnection of various attachments.

By replacing the front attachments, this machine can be used in agriculture, raising stock, landscaping, gardening and snow removal as well as general civil engineering and construction work.

■ Attaching the Front Attachments

Attach the front attachments as follows.

- (1) Choose the flat ground before attaching the front attachments.

- (2) Pull the lock lever in the direction of the arrow and put in at the hook on the multi-coupler.

- (3) Slowly move the machine until the concave part A of the multi-coupler is fitted to the pin ① of the attachment. [R310]

Slowly move the machine until the edge of the multi-coupler adapts to the attachment. [R410]

- (4) Slowly raise the bucket and tilt it back, and both the center of the connecting pins and holes of the attachment can be aligned. [R310]

Slowly raise the bucket and tilt it back so that the edge of the multi-coupler can be fully adapted and both the center of the connecting pins and holes of the attachment can be aligned. [R410]

- (5) The connecting pins are automatically pushed out, and then the attachment is securely connected to the multi-coupler only by releasing the lock lever off the hook.



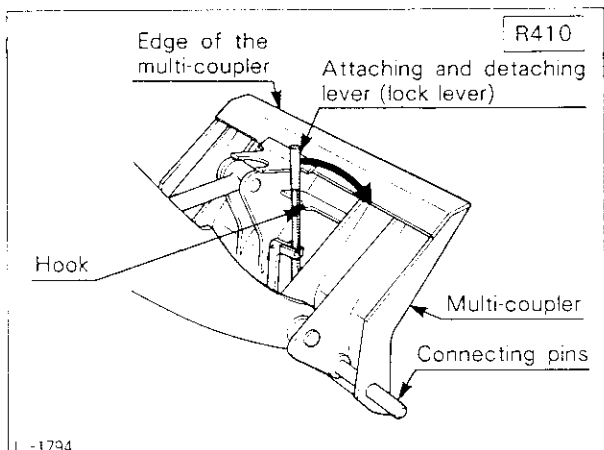
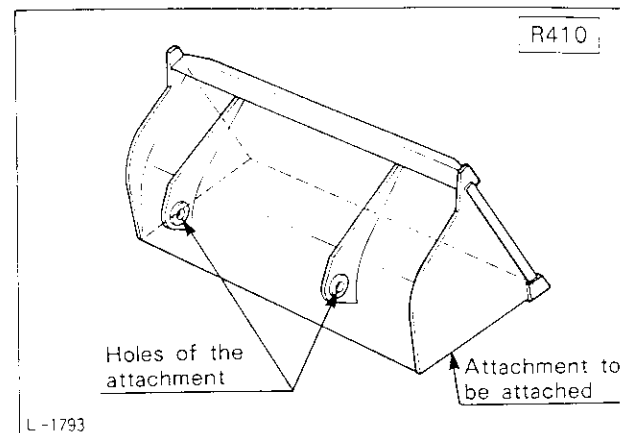
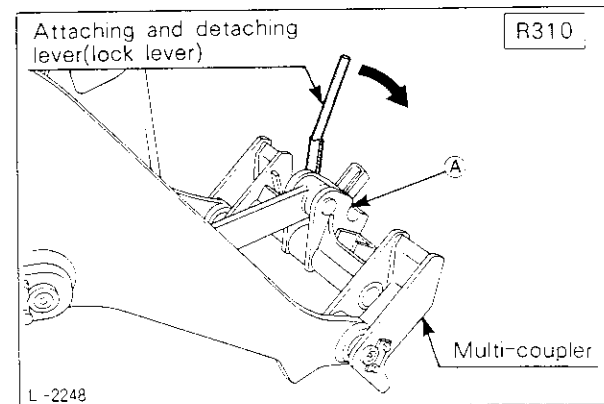
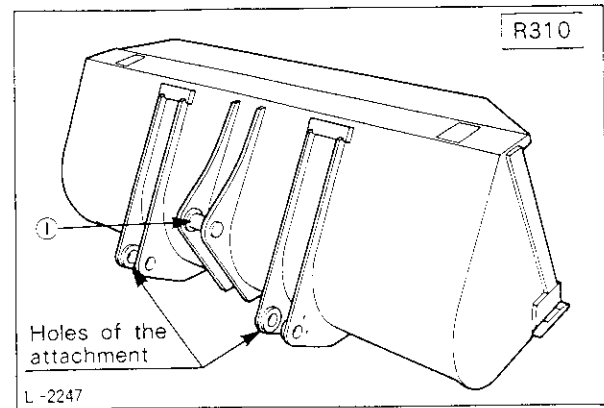
WARNING

To avoid personal injury:

- (1) After doing these procedures, make sure the attachment is securely attached to the multi-coupler, or the attachment may be detached.
- (2) When handling the control lever, you should do it after setting the shuttle change lever to the neutral position and the Hi-Lo shift lever to the parking P position, lowering the bucket, locking all control levers in neutral position.

NOTE:

- It is important to apply grease periodically around the sliding part of the connecting pin so that the front attachment can be easily attached or detached.



[R510]

This machine utilizes a multi-coupler for easy connection and disconnection of various attachments.

By replacing the front attachments, this machine can be used in agriculture, raising stock, landscaping, gardening and snow removal as well as general civil engineering and construction work.

■ Attaching the Front Attachment

- (1) Place machine on flat ground before attaching the front attachments.
- (2) Pull the service port lever in the direction of the arrow **A**, and make sure the indicator and the connecting pins are in the unlatched position.
- (3) Slowly move the machine until the edge of the multi-coupler adapts to the attachment.
- (4) Slowly raise the bucket and tilt it back so that the edge of the multi-coupler can be fully adapted and both the center of the connecting pins and holes of the attachment become aligned.
- (5) Push the service port lever in the direction of the arrow **B**, and make sure the indicator and the connecting pins are in the latched position.
- (6) Lock the service port lever lock for Hydraulic Multi-Coupler **C**.

■ Hoses fitting for Hydraulic Multi-Coupler

Connect the Male Coupler of hose to the Female Coupler on the Hydraulic Multi-Coupler, fit the other side solid (marked green) on the bottom piping (marked green) on the shovel frame with swivel joint.

Connect the Female Coupler of hose to the Male Coupler on the Hydraulic Multi-Coupler, fit the other side solid (marked yellow) on the upper piping (marked yellow) on the shovel frame with swivel joint.



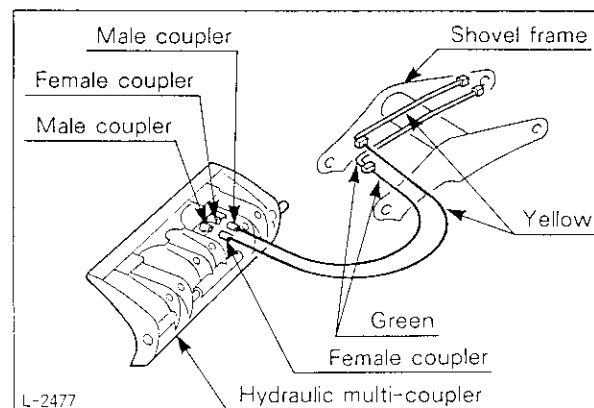
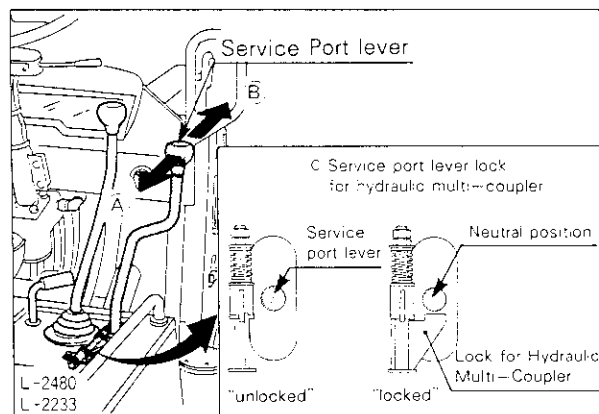
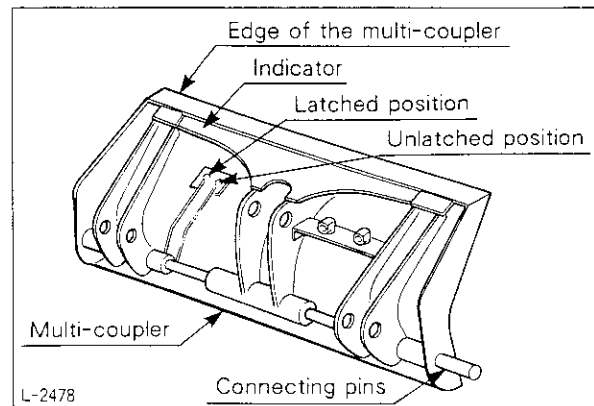
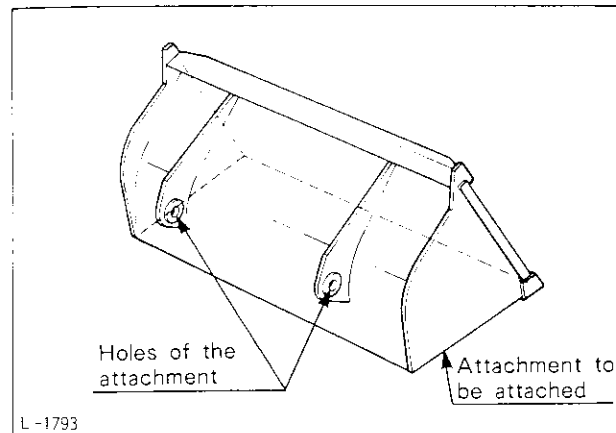
WARNING

To avoid serious personal injury:

- (1) Make sure the attachment is securely latched to multi-coupler and service port lever lock is engaged.
- (2) Failure to follow this procedure may result in separation of attachment from multi-coupler.

NOTE:

- It is important to apply grease periodically around the sliding part of the connecting pin so that the front attachment can be easily attached or detached.



3.11 BACKHOE WORK

The basic instructions that must be followed when working a backhoe are described below.



WARNING

To avoid personal injury:

- (1) Fasten seat belt before operating, if equipped with ROPS.
- (2) Operate backhoe from proper operator's seat position only.
Any other method could result in serious injury.

■ Standard Digging Posture

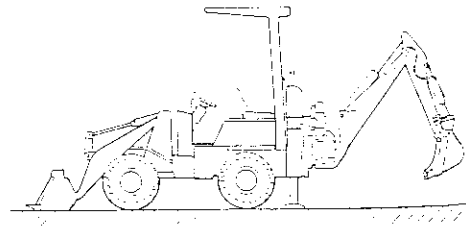
- (1) Lower the bucket to the ground.
- (2) Set the shuttle change lever to the neutral position and the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking P position.
Lock the bucket operating lever in neutral.
- (3) Slide the backhoe so that it aligns with the center line of the machine, then firmly secure it using the slide lock lever.
- (4) Operate the outrigger levers so that the outrigger floats support some of the machine weight.
- (5) Run the engine at the proper speed that matches the work, and start digging.



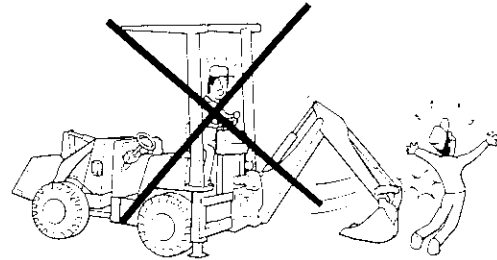
WARNING

To avoid personal injury:

- (1) Before starting work, look around the machine to check that there are no bystanders or obstacles. Never allow anyone to stand in the work area.
- (2) When leaving the machine, stop the engine, set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking P position, lower the bucket and the backhoe to the ground, lock all control levers in neutral, and remove the key.
- (3) When operating the backhoe, lock the shuttle change lever in neutral, set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking P position, and lock the bucket operating lever with the bucket on the ground.
- (4) Never get under the machine while it is being lifted with only the bucket, backhoe, or outriggers when servicing or checking underneath.
Support it firmly with strong blocks, etc. If you do not follow this, serious injury and death can result.

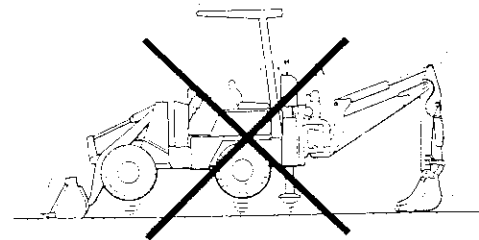


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L-2229

Avoid the "bridge" posture



L-2250

- (5) Operate backhoe from backhoe operator's seat only.
- (6) Before moving the machine, always be in the seat (seat in loader position). Raise the loader bucket and stabilizers sufficiently to clear the ground, and then drive the machine forward. After the machine has been positioned, engage the parking brake and shift transmission controls to neutral. Lower the loader bucket and stabilizers and level the machine.

IMPORTANT:

- Never use the bucket in such a way that its side strikes an object by swinging the bucket boom. Also, do not use the bucket to drive pipes. Such action can damage the digging section.

■ Sliding the Backhoe

This backhoe is provided with a digging section that can slide to the right and left to allow side-digging.

- (1) Place the machine on flat ground, extend the outriggers so that slide frame is level and the wheels are slightly lifted off the ground.
- (2) Swing the boom in the direction opposite to the direction you wish to slide until it touches the rubber cushion.
- (3) Set the slide lock lever in the RELEASE position to release hydraulic lock between the slide frame and the slide bracket.

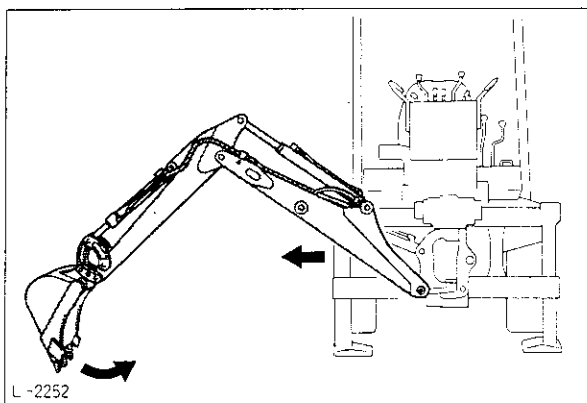
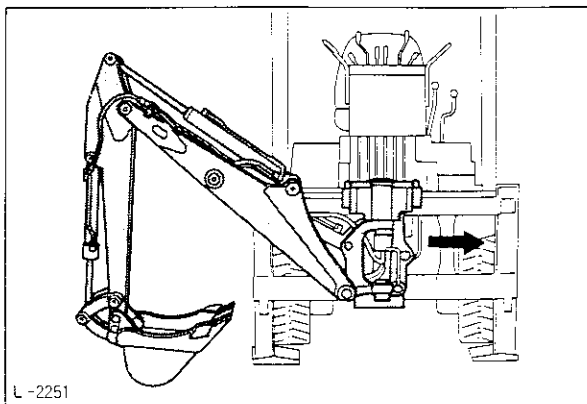
- (4) Lower the bucket, and move the boom, dipperstick and bucket operating levers so that the bucket pushes the ground away. Repeat this operation to slide the backhoe to the desired position.

Depending on the work situation the backhoe can be slid in such a way that the bucket digs into the ground and pulls in the soil.

- (5) When the backhoe has been slid to the desired position, set the slide lock lever to the LOCK position. Shift the bucket lever left side until relief valve works, hold the bucket lever for a couple of seconds while relief valve is working. Repeat this action a couple of times, then hydraulic slide lock will be set.
- (6) Finally, move the dipperstick and bucket to make sure that the hydraulic lock is activated.

IMPORTANT:

- Always lock the slide lock lever. Otherwise, the backhoe will be unstable during work, resulting in possible damage.



■ Operating

◆ Ditch digging

- (1) Position the machine so that it aligns with the center line of the ditch to be digged.
- (2) Lower the outrigger floats and the shovel bucket.
- (3) Dig the ditch by operating the operating levers.
- (4) Move the machine step by step taking into consideration the bucket's dumping reach and proceed in digging.



WARNING

To avoid personal injury:

- (1) When working with a backhoe, lower the outrigger floats and the shovel bucket to stabilize the machine. Working with a backhoe without lowering the outrigger floats will cause the machine to incline or move back and forth. This is extremely dangerous.
- (2) Do not dig around the outrigger floats or tires. If the ground collapses, the machine may fall into the area excavated and result in serious personal injury or death.

IMPORTANT:

- When moving the machine to proceed with digging, always lift the outriggers above the ground.

◆ Digging on a slope

When digging a ditch along a slope, start digging from the top of the ditch and proceed downhill.

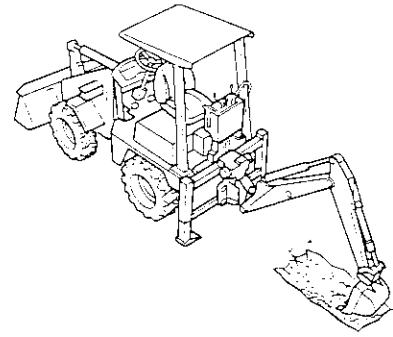
When digging a ditch along a contour line, first scrape off the shoulder of the slope so as to keep the machine level. Dig only after a safe, level place is secured for the machine.

◆ When digging a long ditch

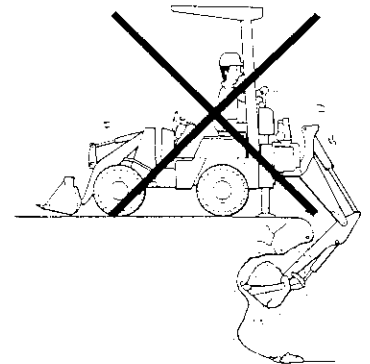
When digging a long continuous ditch, keep a constant depth and use the longest dumping reach so that the number of stops-and-goes is minimized as much as possible.

◆ When side-digging

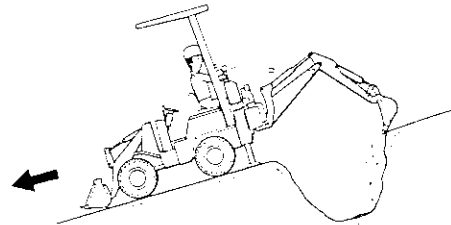
When digging a ditch along an obstacle such as a wall, move the digging section of the backhoe to that direction.



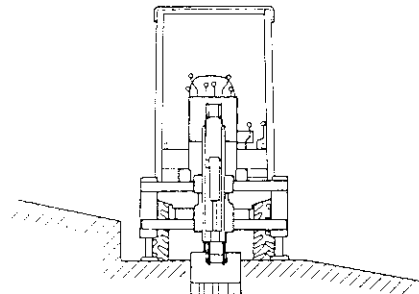
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3.12 ATTACHING AND DETACHING THE BACKHOE



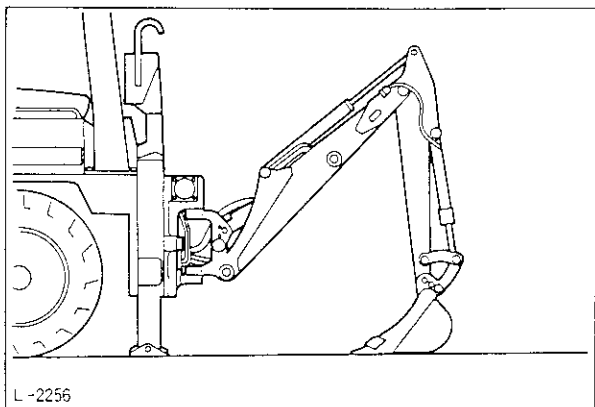
WARNING

To avoid personal injury:

- (1) When the backhoe is removed, the machine's balance is changed.

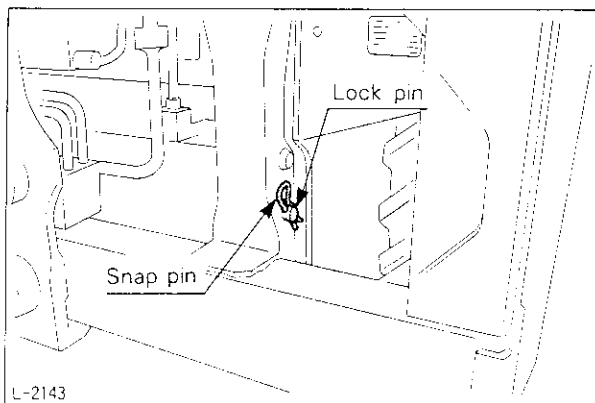
Mount counterweights in place of the backhoe to ensure the stability of the machine and to avoid the danger of tipping over while shoveling.

- (2) The machine's balance changes greatly when the backhoe is slid. This means that sliding the backhoe on a slope or on irregular terrain increases the chance that the machine will tip over. Be sure to slide the backhoe on flat and firm ground to facilitate work and to prevent it from tipping over.
- (3) To prevent the machine from tipping over, position the backhoe in the center of the slide frame.



■ Detaching the Backhoe

- (1) Run the engine at low speeds.
- (2) Position the backhoe in the center of the slide frame.
- (3) Locate the machine on flat ground.
- (4) Extend the outriggers so that their floats approach the ground, but do not touch it.
- (5) Operate the dipperstick, boom and bucket so that the bucket just slightly touches the ground. Do not press the bucket against the ground, too strongly or the wheels will lift off the ground.

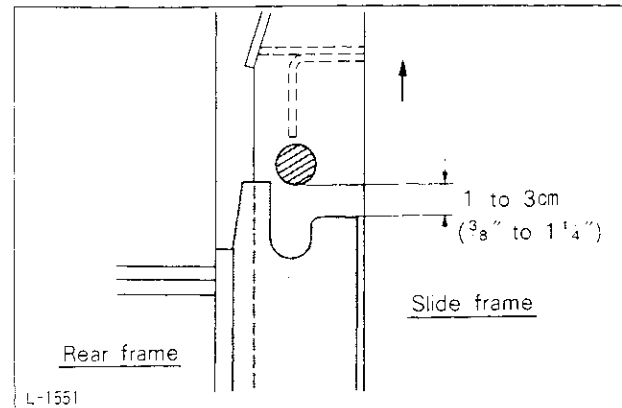


- (6) Pull out the backhoe locking snap pins and lock pins on both sides.

NOTE:

- Temporarily store these pins by fitting them in the holes on the backhoe.

- (7) Extend the outriggers so that the pin on the slide frame is 1 to 3 cm ($\frac{3}{8}$ " to $1\frac{1}{4}$ ") from the rear frame bracket.



- (8) Slowly move the machine forward by gradually pressing accelerator pedal so that its backhoe mounting hook is separated 1 to 10 cm ($\frac{3}{8}$ " to 4") from the backhoe.

IMPORTANT:

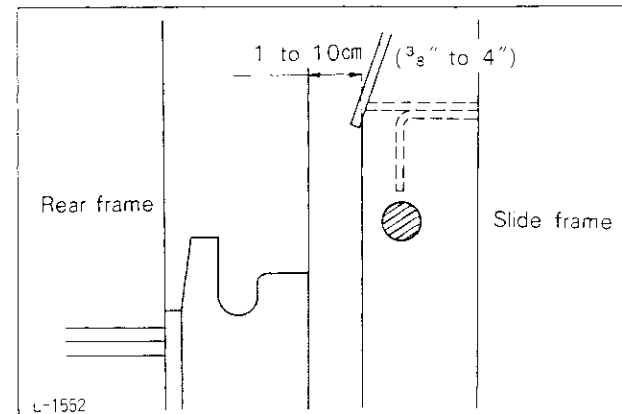
- Since the hydraulic oil piping is still connected, the machine should be moved very little when moving forwards so as not to pull the hose tight.
- (9) Slowly retract the outriggers fully to settle the backhoe.

IMPORTANT:

- Should the slide frame tilt forward or backward at this time, operate the boom and dipperstick levers to maintain a proper, safe posture. Then retract the outriggers.
- (10) Stop the engine and move the four backhoe operating levers to relieve pressure inside the hydraulic circuit. Repeat lever operation until the backhoe components no longer move.

NOTE:

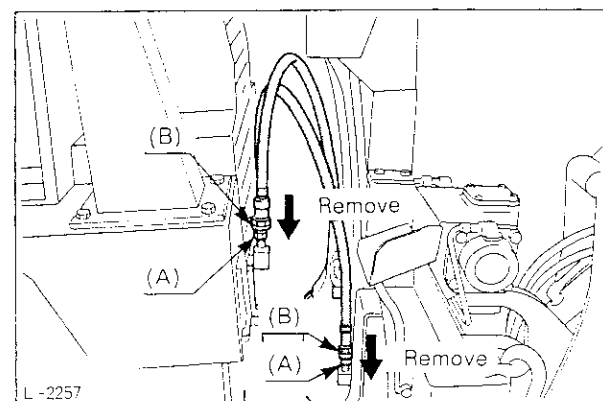
- If pressure inside the hydraulic circuit remains, the quick coupler will be difficult to attach or detach.

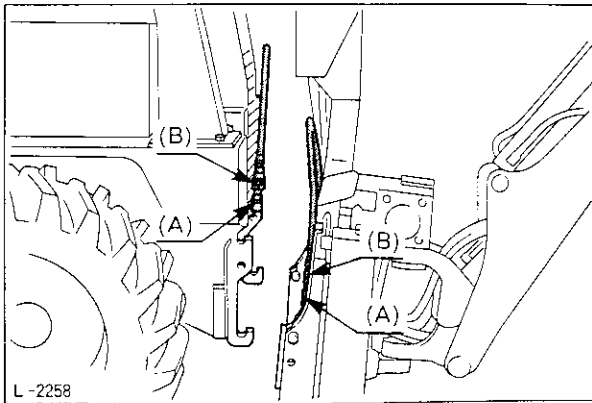


- (11) Disconnect the two hydraulic hoses connecting the machine and the backhoe.

NOTES:

- (1) To disconnect the hose, push in the sleeve (A) of the quick coupler, and at the same time, pull the hydraulic hose (B) in the opposite direction.





- (2) To connect the hose, push in the sleeve (A) of the quick coupler and, at the same time, push in the hydraulic hose (B) in the same direction.

IMPORTANT:

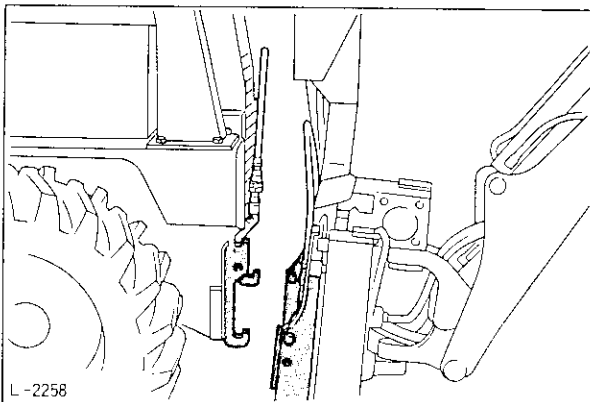
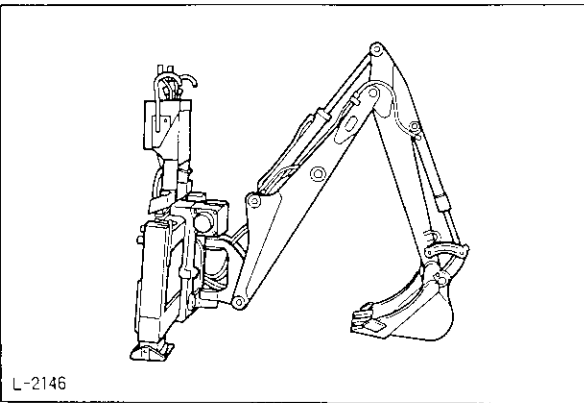
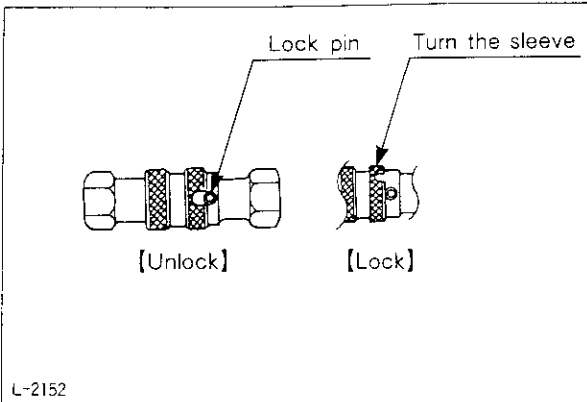
- (1) Never leave the quick coupler disconnected. Reconnect it as quickly as possible to prevent the entry of dirt or other foreign matter.
- (2) Always stop the engine before disconnecting or reconnecting the quick coupler. The quick coupler is provided with lock pins for safety purpose. After connecting it, make sure that it is locked by turning the sleeve.



WARNING

To avoid personal injury:

- (1) If the backhoe is detached from the machine and left unused, retract the outriggers as shown in the Fig. to ensure a safe posture and lock the backhoe operating lever.
- (2) When the backhoe is detached from the machine, immediately mount counterweights in its place. This ensures safety when shoveling.



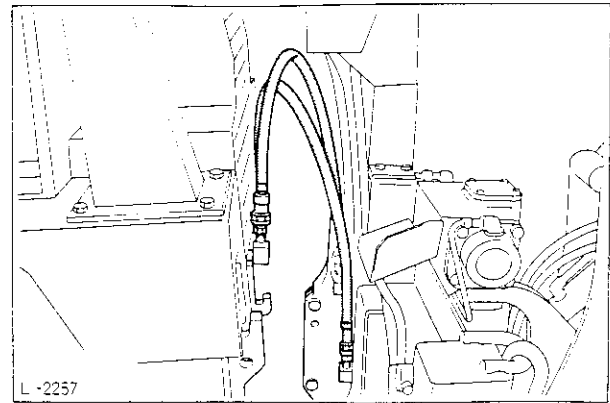
■ Attaching the Backhoe

- (1) Position the machine so that its center line aligns with the center line of the backhoe.
- (2) Slowly move the machine by operating the inching pedal until it almost touches the backhoe.

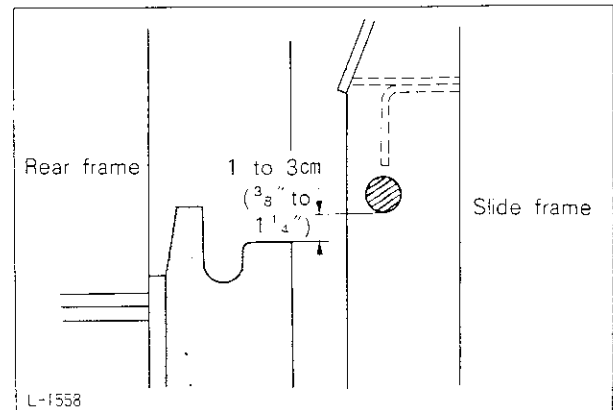
IMPORTANT:

- When bringing the machine near the backhoe, run the engine at low speed.

- (3) Stop the engine and reverse the hydraulic hose connections at the quick couplers, that is, reconnect the hose on the machine side to the backhoe, and reconnect the hose on the backhoe side to the machine.

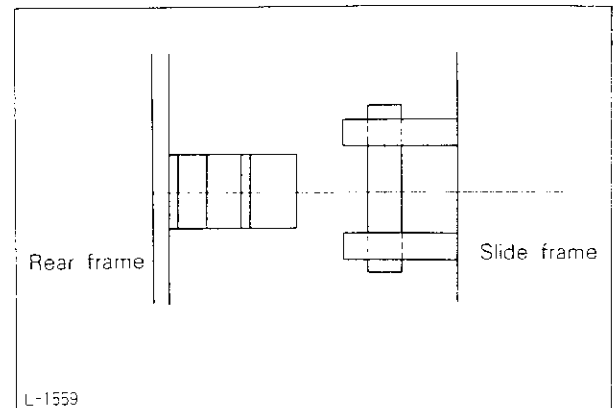


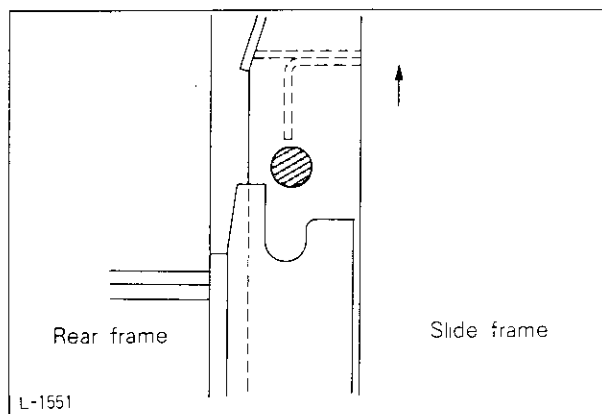
- (4) Start the engine and release the operating lever lock. Extend the right and left outriggers so that the pin on the slide frame is 1 to 3 cm ($\frac{3}{8}$ " to $1\frac{1}{4}$ ") above the rear frame bracket.



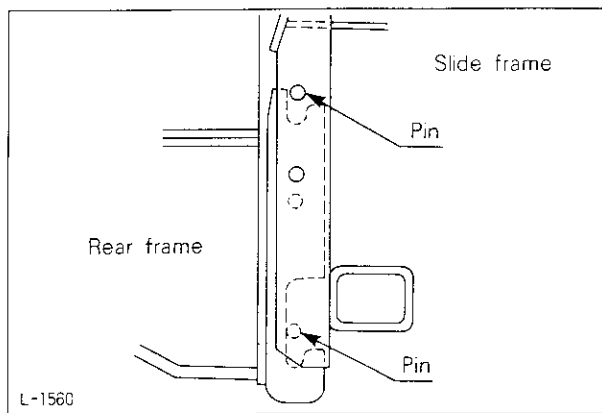
IMPORTANT:

- Make sure that the center line of the rear frame aligns with that of the slide frame bracket when viewed from above.

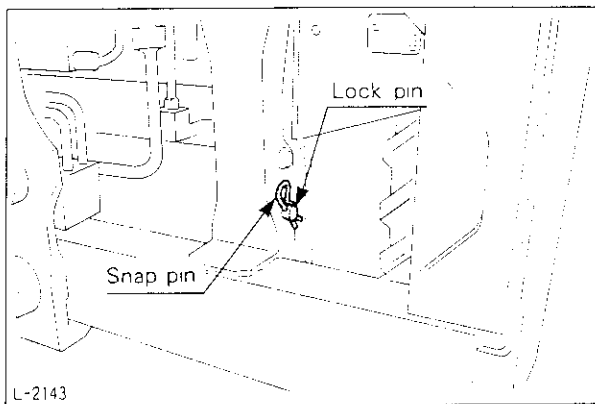




- (5) Slowly back the machine further to fit the rear frame bracket into the slide frame bracket.



- (6) Gradually retract the right and left outriggers evenly so that the two pins on the slide frame properly fit into the two rear frame bracket grooves.



- (7) Insert the fixing pins and secure them with the snap pins.

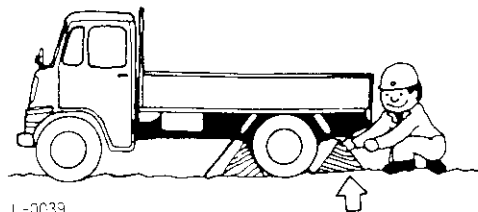
IMPORTANT:

- After attaching the backhoe, gradually increase the engine speed and make sure that the backhoe moves as intended.

4. TRANSPORT BY TRUCK

■ Loading on a Truck, off-Loading

- (1) To load the machine onto a truck, apply the parking brake of the truck, block the front and rear wheels.



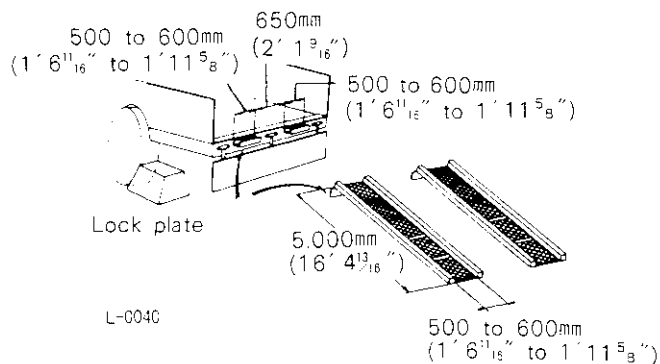
- (2) Install the ramps with lock plates securely.



WARNING

To avoid personal injury:

- (1) When loading or off-loading the machine on or from a truck, be sure to use strong planks. Never use wet lumber, etc.
- (2) Keep the planks at an angle such that the machine can be kept stable (10 to 15°). Never try to change directions while on the planks.



- (3) Support the rear end of the bed to prevent the truck front from rising.

- (4) When loading or off-loading the machine on or from a truck, keep the bucket 40 cm (1' 3 3/4") up from ground. And reverse the machine at the low-speed (D) or advance it at the same speed to off-load it.



WARNING

To avoid personal injury:

- Do not alter the climbing direction once already on the ramps.
- If direction of climb needs correcting, first bring the machine down off the ramps and make the directional correction.



**CAUTION**

To avoid personal injury:

- (1) To prevent the machine from moving during transport, machine must be blocked, and the unit be stabilized on the truck bed by using a wire rope.
- (2) When transporting the machine and backhoe, set the boom, dipperstick and buckets in the minimum dimensions to improve the balance of the machine.
- (3) After ensuring that the machine is secure on the truck bed, stop the engine, lock the shuttle change lever in neutral, set the Hi-Lo shift lever (R310 · R410) or the parking brake lever (R510) to the parking **P** position, lower the bucket, lock all control levers and secure the steering frame lock.
- (4) When loading and unloading the machine, retract the outriggers completely so that they are not caught by the ramps.

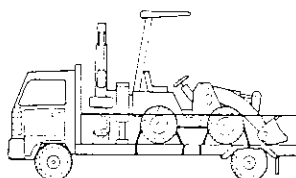
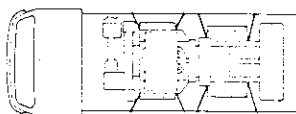
IMPORTANT:

- When advancing, reversing or turning the machine on the truck bed, be careful not to hit the cabin and the gates.

■ Transportation

After loading the machine, lower the bucket, backhoe and outriggers on the truck bed. Set the shuttle change lever to the neutral position and the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) to the parking **P** position.

Securely fasten the machine to the truck or trailer.



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**WARNING**

To avoid personal injury:

- (1) Before transportation, do the following to prevent the machine from moving during transportation.
 - Check to see that the machine's center point aligns with that of the truck bed.
 - Stop the engine.
 - Lock the shuttle change lever in neutral, set the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) to the parking **P** position.
 - Lower the bucket to the truck bed and lock all control levers.
 - Secure the steering frame lock.
 - Block the machine's wheels.
 - Chain the machine securely.
- (2) Avoid sudden gear changes, fast starts, sudden stops and abrupt turns while driving the truck to prevent the machine from shifting while transporting.

■ Traveling in the Work Site and on Road

- (1) Bring the slide bracket to the far right position, lock the slide bracket, fold the backhoe and retract the bucket fully.



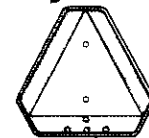
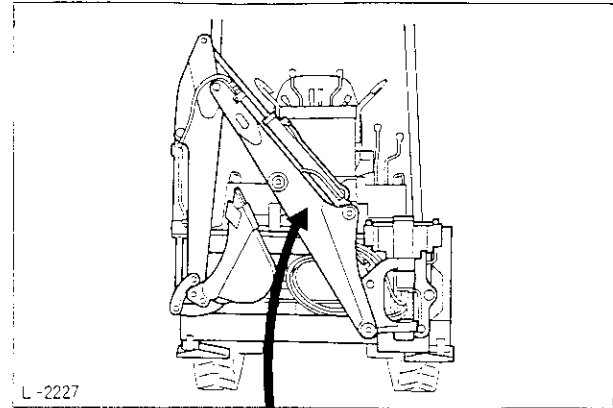
WARNING

To avoid personal injury:

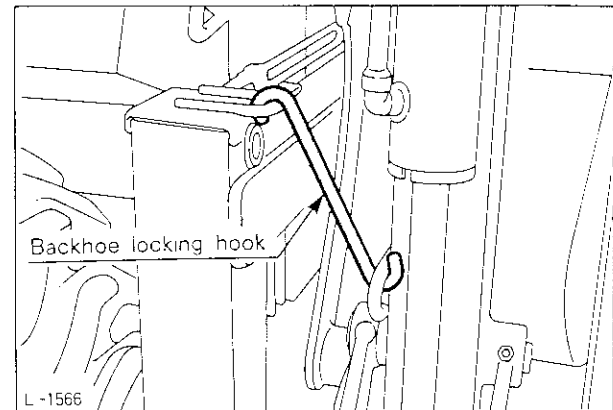
- Before traveling on the road, observe all local and state traffic regulations. Use SMV emblem and warning flashers as required.
- (2) When traveling in the work site, especially on roads, do not forget to attach the backhoe locking hook.
 - 1) Crowd the bucket fully.
 - 2) Crowd the dipperstick fully.
 - 3) Raise the boom fully.
 - 4) Swing the boom to left side fully.
 - 5) Attach the backhoe locking hook.
 - 6) Stop the engine and then operate the boom lever to relieve hydraulic pressure and secure the locking hook.

IMPORTANT:

- Do not pull the locking hook with hydraulic power. Lock the locking hook with gravity after stopping the engine.



SMV emblem



5. HANDLING LOADER IN COLD-WEATHER

5.1 PREPARATIONS FOR COLD WEATHER

- (1) Change engine oil to one of low-viscosities suitable for use in cold weather.
- (2) In cold weather, battery power drops, and electrolyte may freeze if the battery is not sufficiently charged. To prevent electrolyte from freezing, be sure to keep the battery charged at 75% or more of capacity after an operation is over. Also keep the battery indoors to facilitate next starting. If the battery electrolyte level is low, do not add distilled water after operating, do it before starting the next operation while the engine is running.
- (3) Add anti-freeze to cooling water in the radiator and reserve tank, if ambient temperature might drop below 0°C (32°F) while the machine is out of use. Mixing ratio between water and anti-freeze is determined by how low the ambient temperature will be.

- Mixing ratio between water and anti-freeze

Ambient temperature °C (°F)	-5 (+23)	-10 (+14)	-15 (+5)	-20 (-4)	-25 (-13)	-30 (-22)	-35 (-31)	-40 (-40)
Anti-freeze %	30	30	30	35	40	45	50	55
Water %	70	70	70	65	60	55	50	45

IMPORTANT:

- (1) Use a permanent-type anti-freeze or long-life coolant.
- (2) Be sure to drain cooling water completely and deposits from the radiator interior before adding solution, that is mixture of water and anti-freeze.
- (3) Anti-freeze contains anticorrosive, it is not necessary to add radiator cleaner to the mixture of water and anti-freeze.
- (4) The radiator capacity is about 5.1 liters (1.35 U.S. gals) [R310], 8.5 liters (2.25 U.S. gals.) [R410], 8.2 liters (2.17 U.S. gals.) [R510].

5.2 POST-OPERATION DIRECTIONS

After operation, be sure to remove mud or water on the machine's body.

Then park the machine on concrete or where ground is dry. Lay planks or mats on the ground and park the machine on them. If the machine should be parked on the ground and the tires freeze during the night, driving will be impossible.

It is also important to wipe the piston rod surface of the oil pressure cylinders completely. If mud should enter the seal with frozen water, it may be damaged.

Water in the fuel system should be drained to prevent freezing at night.

6. MAINTENANCE

■ Maintenance

To safely use the machine and prevent any trouble from occurring, be sure to conduct daily inspections and periodic servicing.

IMPORTANT:

- (1) If machine cannot be operated and must be towed, please contact your local Kubota dealer for correct towing procedures.
- (2) For parts that are difficult to service or inspect and for details regarding construction and functions, contact your Kubota dealer.
- (3) Clean the machine so that it is easy to find what is wrong.

Clean the oil replenishment parts and the oil level gauge in particular to keep them free of dust and other foreign matter.


When washing, be careful not to get the electric parts wet.

- (4) Check or replenish the oil in a place where there is little dust and use a clean oil container to prevent dust from permeating the oil.
- (5) Check or replenish oil when the machine is level. Use the same brand when replenishing oil.
- (6) After greasing the machine, wipe off all old grease, especially from those parts where sand and dust can accelerate wear.
- (7) When changing the oil or replacing the filter, check whether the old oil or filter is abnormally permeated with metal filings or foreign matter.
- (8) Use a light oil or noncombustible washing agent to wash the parts.
- (9) The oil level in machine's hydraulic tank will vary when a backhoe is attached. Check the oil level through the oil gauge, and, if insufficient, add the recommended hydraulic oil.



WARNING

To avoid personal injury:

- (1) **Never get under the machine while it is being lifted with only the bucket, backhoe, or outriggers. If servicing or checking underneath, support it firmly with strong blocks, etc.**
If you do not follow this, serious injury or death can result.
- (2) Before servicing or checking the machine, do the following things.
 - Stop the engine.
 - Set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking  position.
 - Lower the bucket and attachment to the ground.

- Lock all control levers in neutral.
- Remove the key.
- Secure the front and rear frames with the steering frame lock.

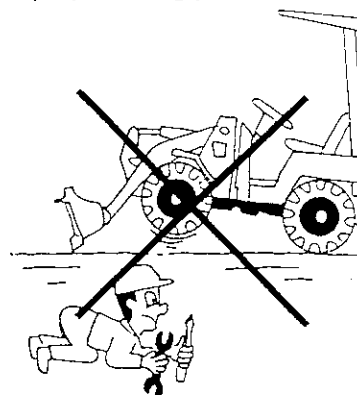
- (3) Keep clear of articulation area when servicing.
- (4) Keep all sparks and flames away from the fuel and the oil.
- (5) To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building without proper ventilation.



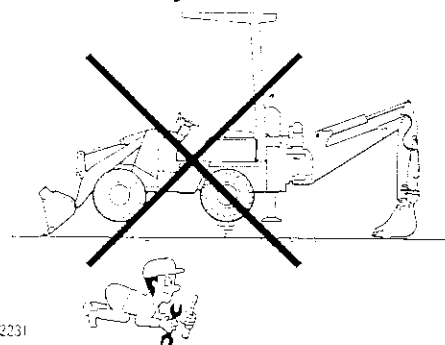
CAUTION

To avoid personal injury:

- (1) When servicing or checking the electric system, disconnect the battery terminals.
- (2) Wear safety wear such as a helmet, glasses and safety shoes.
- (3) Never touch the relief valves because all of them have been adjusted to proper setting pressure at the factory.



L-1734



L-2231

6.1 ROUTINE CHECK

It is of utmost importance to maintain your machine properly to prevent trouble.

- (1) Check to see that there is no trace of water or oil leak by walking around the machine carefully check connections of high-pressure hoses, oil pressure cylinder and fuel piping. If there are any leaks, take proper measures to stop them. If repair is impossible, contact your Kubota dealer.
- (2) Check for loose bolts and nuts and tighten if necessary, especially check the hub bolts of tires.
- (3) Check the electric circuit for any disconnections, shorts or loose terminals.

■ Routine Check Points

Check Points		Quantity	Supplies & Change Parts	Reference Pages
1. Parts that has trouble during previous use: check.		—	—	—
2. Check cooling water quantity in radiator and replenish as necessary.		1	Water or Antifreeze	61
3. Check fuel and oil quantity and replenish as necessary.	(1) Check engine oil level gauge and refill as necessary.	1	Engine oil	62
	(2) Check hydraulic oil level gauge and refill as necessary.	1	Engine oil	62
	(3) Check fuel gauge and refuel as necessary.	1	Light oil No.2 (ASTM D975)	63
	(4) Brake fluid reservoir.	1	Hydraulic oil	63
4. Greasing	(1) Lift arm attachment pin.	2	Grease, EP2	64
	(2) Bucket attachment pin.	2		
	(3) Tilt link pin.	1		
	(4) Tilt arm pin.	3		
	(5) Tilt cylinder bottom pin.	1		
	(6) Lift cylinder rod pin.	2		
	(7) Lift cylinder bottom pin.	2		
5. Universal joint: grease		3		65
6. Center pin: grease		1		65
7. Articulate shaft: grease		1		65
8. Steering cylinder pin: refill		2		66
9. Check inflation and wear or damage to tires, check for loosened bolts.		4	—	80
10. Check radiator and oil cooler fins for clogging.		—	—	66
11. Check the parking brake.		1	—	67
12. Check the brake pedal.		1	—	67
13. Check function of steering wheel.		1	—	67
14. Check bolts and nuts for tightness, retighten as necessary.		—	—	67
15. Check for cable breakage, short circuit, or terminal looseness.		—	—	67
16. Check stain, damage of SMV emblem		—	—	67
17. Check the lamps and meters.		—	—	67
18. Testing the horn.		1	—	67
19. Oil and water leakage.		—	—	67

■ Backhoe

Check Points		Quantity	Supplies & Change Parts	Reference Pages
1. Walk around check on the backhoe.		—	—	—
2. Oil level in the hydraulic tank.		1	Recommended hydraulic oil	—
3. Sliding section of the slide frame.		2	Grease, EP2	66
4. Greasing (Backhoe)	(1) Swivel case	1	Grease, EP2	64
	(2) Swing bracket	2		
	(3) Swing bracket	1		
	(4) Boom mounting pin	1		
	(5) Boom cylinder bottom pin	1		
	(6) Dipperstick cylinder bottom pin	1		
	(7) Boom cylinder rod pin	1		
	(8) Dipperstick cylinder rod pin	1		
	(9) Dipperstick mounting pin	1		
	(10) Bucket cylinder bottom pin	1		
	(11) Bucket cylinder rod pin	1		
	(12) Bucket mounting pin	1		
	(13) Bucket link pin	1		
	(14) Bucket link pin	1		

■ Checking Coolant Level and Replenishing

The radiator is equipped with a reserve tank. When the cooling water level drops in the radiator, water is added automatically from the reserve tank. It is necessary to check the water level in the reserve tank and refill water if necessary. Do not disconnect the hose but remove the cap. If the water level is between "FULL" and "LOW", the condition is normal. If it drops quickly, water may be leaking somewhere, be sure to find the cause of leakage.

IMPORTANT:

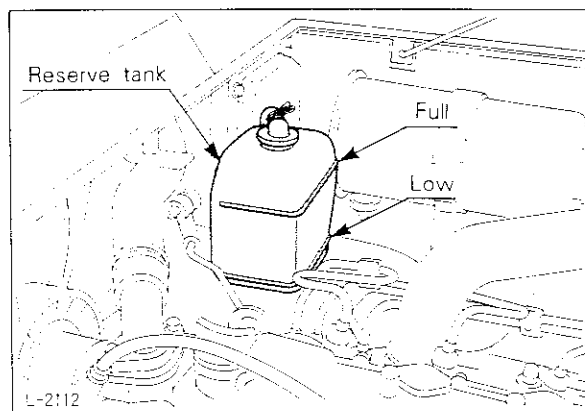
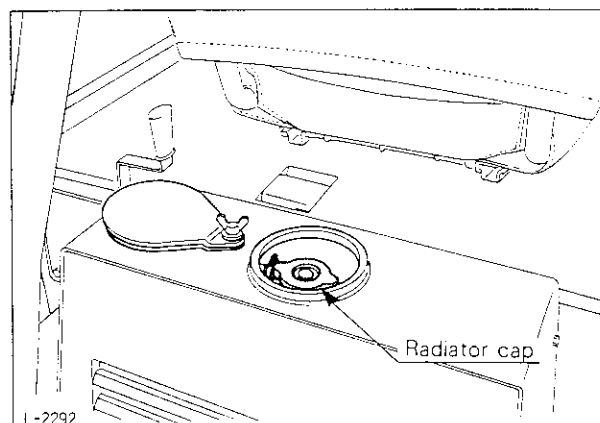
- (1) Do not fill the reserve tank above the "FULL" mark.
- (2) Add only clean water or coolant.

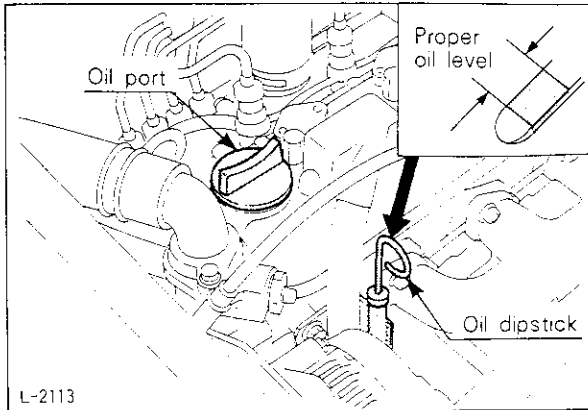


WARNING

To avoid personal injury:

- Do not remove radiator cap while coolant is hot. When cool, rotate the cap to the first stop to allow excessive pressure to escape. Then remove the cap completely.



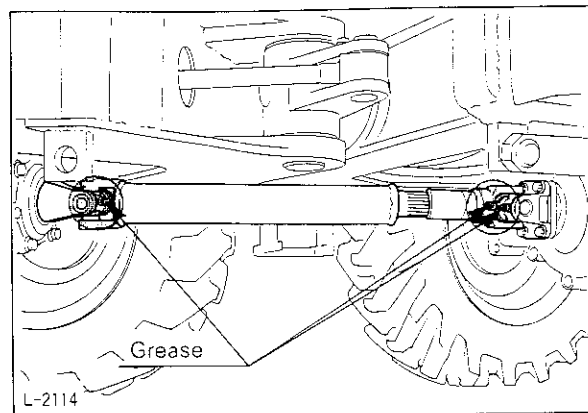


■ Checking the Engine Oil

Insert the oil dipstick all the way into the oil port, take it out, check the oil level, and add oil if necessary. When checking engine oil level, make sure that the machine body is level.

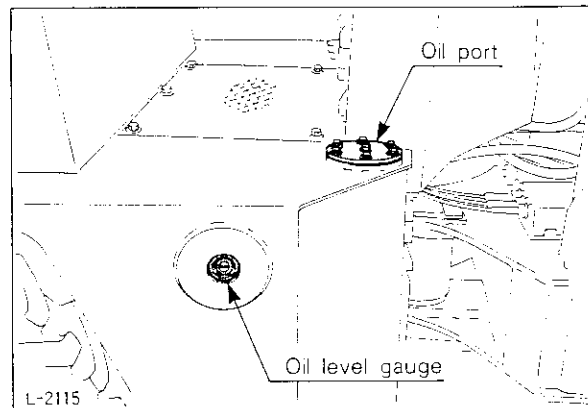
IMPORTANT:

- (1) Use engine oil of appropriate viscosity according to outside temperature. (See page 87)
- (2) Immediately after the engine stops, it is difficult to check the oil level exactly as the oil remains in each part. Check the oil level with the machine body level at least five minutes after engine is shut off.



■ Cleaning and Checking after Operating in Muddy Areas

- (1) If the machine is used in muddy areas, immediately wash it with water to remove the mud and dirt.
- (2) After washing it, check the following parts. Check and lubricate the front universal joint.



■ Checking Hydraulic Oil Level

- (1) Stop the machine on flat ground and lower the bucket to the ground.
- (2) Check the hydraulic oil.
- (3) If the oil level is between the upper and lower marks, the amount of the oil is appropriate.
- (4) If the hydraulic oil level is outside the proper range, add oil through the oil port. Use diesel engine oil for LST oil.

IMPORTANT:

- (1) When refilling the hydraulic oil, wipe sand and dust off the area around the oil port, and use the same brand of the same hydraulic fluid maker.
- (2) Never mix hydraulic oils of different manufacturer. (See page 87)
- (3) The oil level in the machine's hydraulic tank will vary when a backhoe is attached. Check the oil level through the oil gauge, and, if insufficient, add the recommended hydraulic oil.



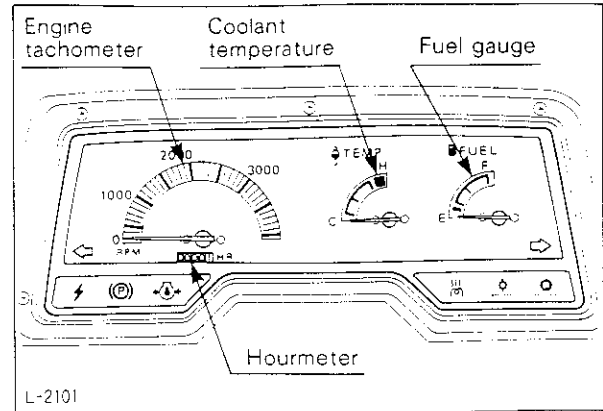
WARNING

To avoid personal injury:

- Never open the oil port immediately after the engine has stopped or hydraulic oil may rush out, causing scalding.

■ Checking the Fuel and Replenishing.

- (1) Check the fuel level at the fuel gauge.



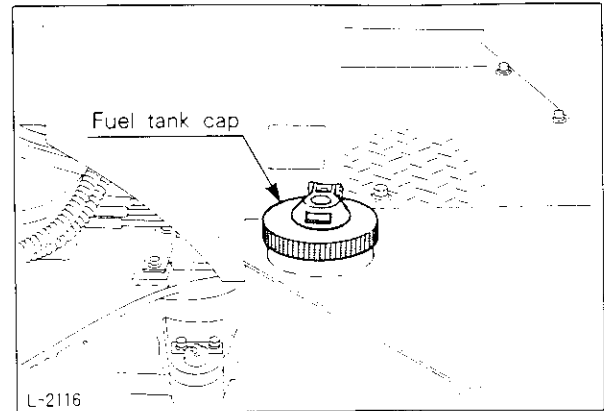
- (2) Open the fuel tank cap with the key and add the fuel if necessary.



WARNING

To avoid personal injury:

- Before refueling, always stop the engine, set the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) to the parking P position, lower the bucket and attachment to the ground, lock all control levers in neutral, and remove the key. Keep sparks and flames away from the fuel while refueling, or serious personal injury result.



IMPORTANT:

- (1) Avoid fuel spills and overfilling the fuel tank.
- (2) Every time after operation is over, fill the fuel tank fully and be sure to replace on the cap.

■ Checking and Replenishment of Oil in the Brake Fluid Reservoir

Check the brake oil level. The level must be between the upper and lower marks on the brake fluid reservoir.



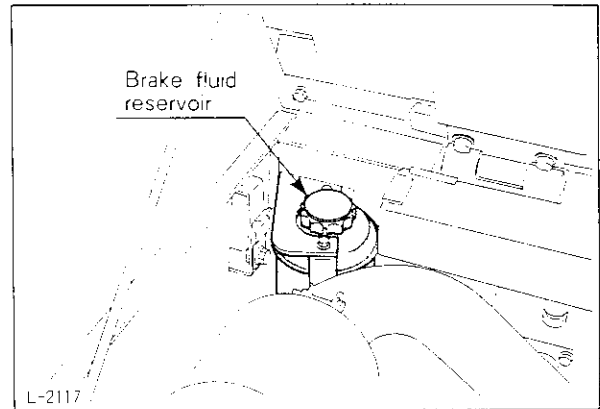
WARNING

To avoid personal injury:

- Only use hydraulic oil that meets ISO VG 32.
Use of incorrect oil will cause damage of brake parts and potential brake failure.

IMPORTANT:

- If oil is used up sooner than expected, check the brake lines for oil leaks.



■ Grease Fittings



WARNING

To avoid personal injury:

- (1) Before greasing, stop the engine, set the Hi-Lo shift levers (R310-R410) or the parking brake lever (R510) to the parking \textcircled{P} position, lower the bucket and attachment to the ground, lock all control levers in neutral, and remove the key.
- (2) Always use the lift arm support when servicing the machine with the loader lift arms raised. Severe injury can occur to you or other persons in the area if the machine lift arms are lowered by accident.



DANGER

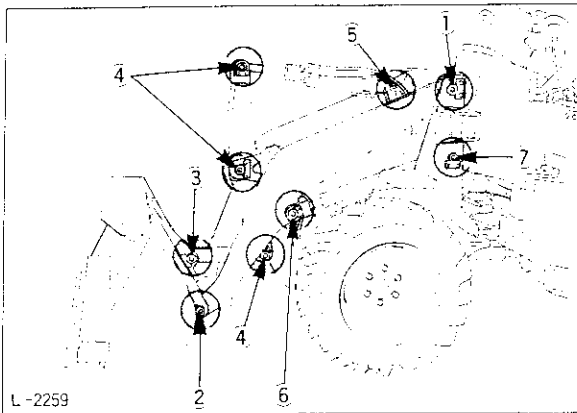
To avoid personal injury:

- Keep clear of articulation joint in area of service.

◆ Greasing bucket section

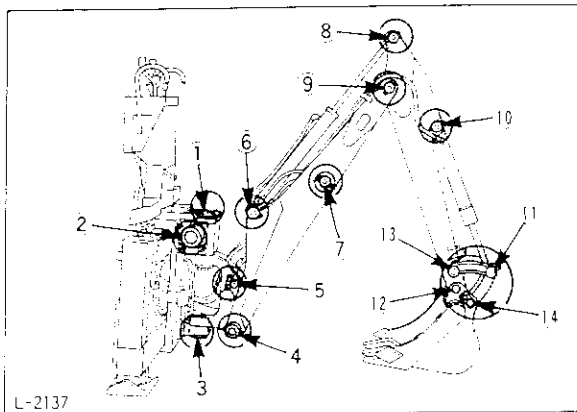
Apply grease to the nipples indicated by the arrows in the illustration.

- | | |
|----------------------------|------------|
| ① Lift arm attachment pin | (2 places) |
| ② Bucket attachment pin | (2 places) |
| ③ Tilt link pin | (1 place) |
| ④ Tilt arm pin | (3 places) |
| ⑤ Tilt cylinder bottom pin | (1 place) |
| ⑥ Lift cylinder rod pin | (2 places) |
| ⑦ Lift cylinder bottom pin | (2 places) |



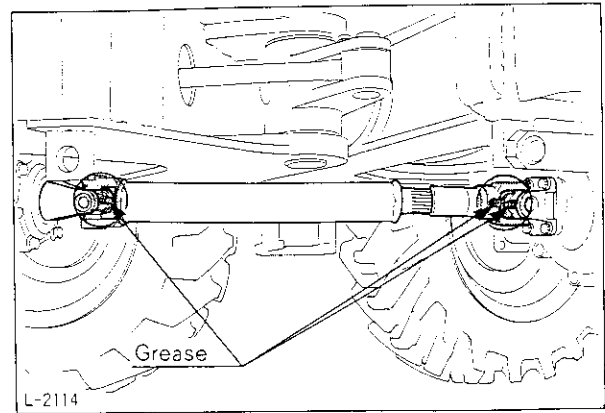
◆ Greasing backhoe section

- | | |
|--------------------------------|------------|
| ① Swivel case | (1 place) |
| ② Swing bracket | (2 places) |
| ③ Swing bracket | (1 place) |
| ④ Boom mounting pin | (1 place) |
| ⑤ Boom cylinder bottom pin | (1 place) |
| ⑥ Arm cylinder bottom pin | (1 place) |
| ⑦ Boom cylinder rod pin | (1 place) |
| ⑧ Dipperstick cylinder rod pin | (1 place) |
| ⑨ Dipperstick mounting pin | (1 place) |
| ⑩ Bucket cylinder bottom pin | (1 place) |
| ⑪ Bucket cylinder rod pin | (1 place) |
| ⑫ Bucket mounting pin | (1 place) |
| ⑬ Bucket link pin | (1 place) |
| ⑭ Bucket link pin | (1 place) |



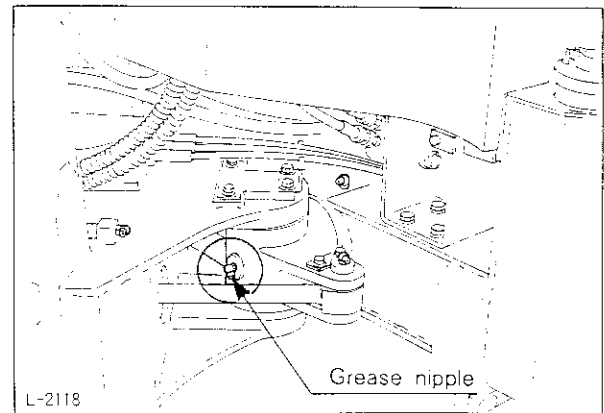
◆ **Greasing the universal joint**

Apply grease to the universal joint at three grease nipples.



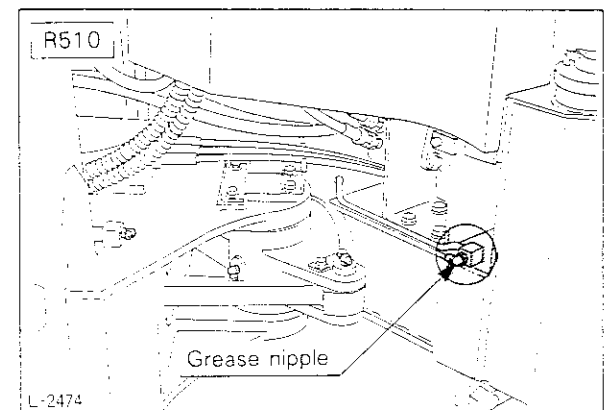
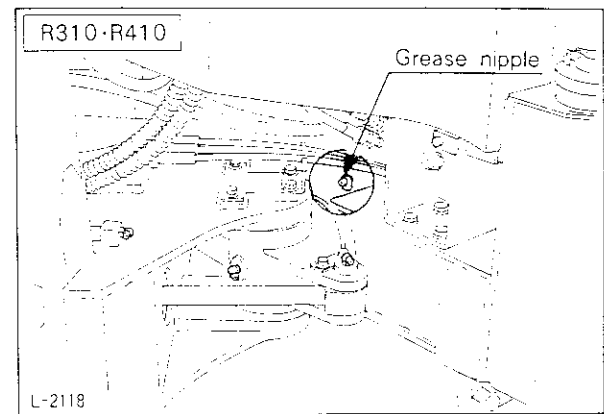
◆ **Greasing the center pin**

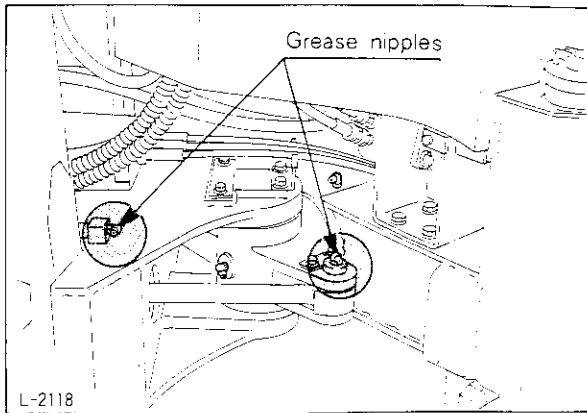
Apply grease to the center pin at one grease nipple.



◆ **Greasing the articulate shaft**

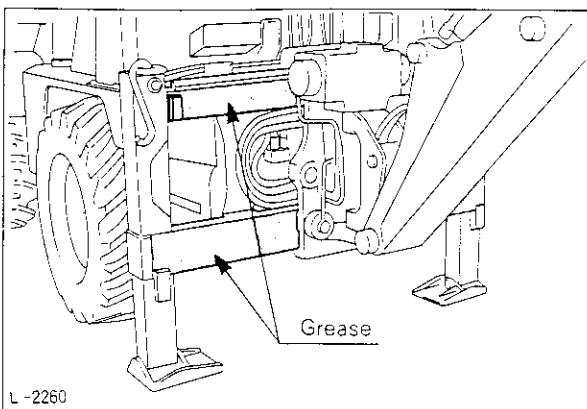
Apply grease to the articulate shaft at one grease nipple.





◆ Greasing the steering cylinder pin

Apply grease to the steering cylinder pin at two grease nipples, one on the rod side and the other on the bottom side.



◆ Greasing the sliding section of the slide frame

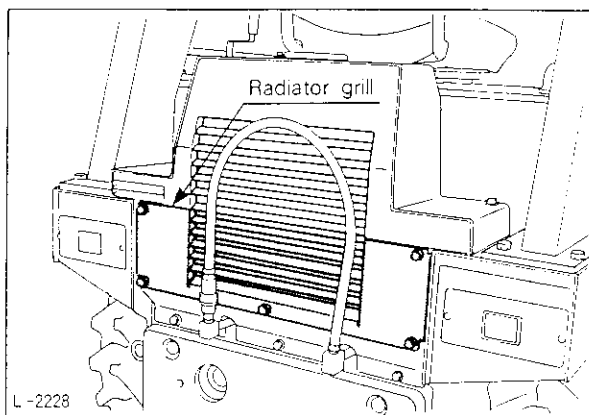
Check that the guide rail is sufficiently greased. If insufficient, apply extreme pressure lubricant (EP2 grease).

■ Checking Tire Pressure, Wear and Damage and Bolts


Refer to the section on "Handling the Tire" for checking. (See page 79)

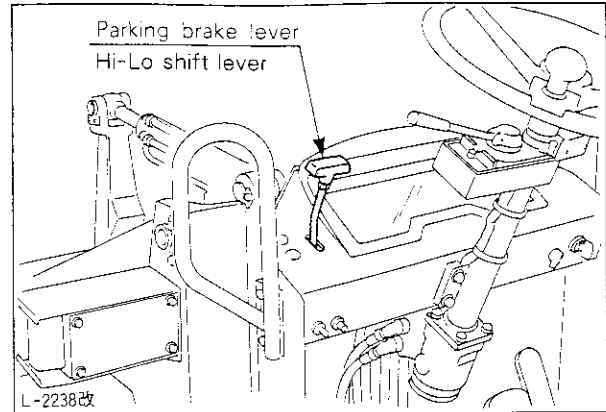
■ Checking and Cleaning the Radiator and Oil Cooler Fins.

- (1) Remove the radiator grill.
- (2) Check the fins for clogging. If clogged, they should be cleaned out with a jet of compressed air or steam.
- (3) Check the rubber hose for damage. If broken or cracked, change it. Also, check to see that the hose clamp is tight.



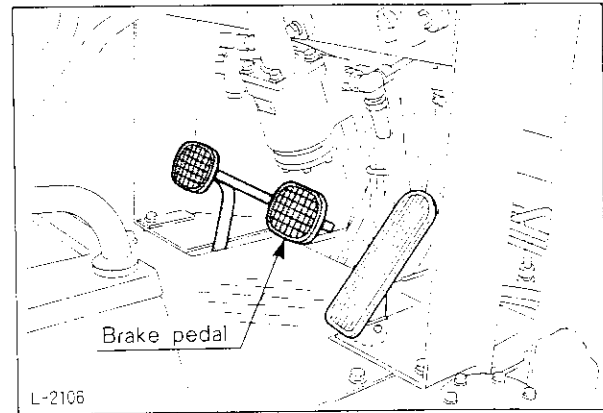
■ Checking the Parking Brake

- (1) Set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking  position to test its performance.
- (2) If it fails to work effectively, it must be adjusted by your Kubota dealer.



■ Checking the Brake Pedal

- (1) Check the brake pedal.
- (2) If it fails to work effectively, it must be adjusted by your Kubota dealer.



■ Checking the Steering Wheel

- (1) Start the engine, turn the steering wheel left and right and check the operation.
- (2) If any abnormality is found, have it inspected further by your Kubota dealer or designated service center.

■ Checking and Tighten Loose Bolts and Nuts.

Check the bolts and nuts and tighten them if necessary.

■ Checking Electric Wiring for Shortcircuits and Loose Terminals.

Check them carefully, since any defects will cause electric problems.



CAUTION

To avoid personal injury:

- (1) Never wear metal rings or metal watch bands. You can make a ground for the electric circuit and get a burn on your hand or arm.
- (2) Know the electric circuit before you connect or disconnect an electrical component. A wrong connection can cause injury or damage.

■ Checking the SMV Emblem for Stains and Damage

Check the SMV emblem for damage and stains, and replace if necessary.

■ Checking the Lamps and Meters

- (1) Check that the lamps flicker normally.
- (2) Check that the meters work normally.

■ Testing the Horn

Check the horn's sound and operation.

■ Checking Oil and Water Leak

Visually check the machine's body.

6.2 PERIODIC CHECK

Whether the machine is properly lubricated and maintained directly determines the trouble frequency and service life of the machine. Periodically check and maintain your machine, and you will find in the long run that the jobs can be finished earlier and more economically.

Shown in the Periodic Check and Maintenance Chart below are the hours indicated on the hourmeter (see page 21); practically, it will be convenient to schedule the time of inspection and maintenance according to the calendar (day, week, month) on the basis of the chart. If the machine is used in harder-than-usual working conditions, it must be checked and maintained at shorter intervals.

■ Periodic Check and Maintenance Chart (Do all previous checks in addition to New checks.)

Maintenance Hours (Hourmeter)	First	First	First	Mainte-	Mainte-	Mainte-	Mainte-	Mainte-	Mainte-	Mainte-	One	Two	Refer-
Items of Maintenance	35hrs	100hrs	500hrs	nance every 50hrs	nance every 100hrs	nance every 200hrs	nance every 250hrs	nance every 500hrs	nance every 1000hrs	nance every 2000hrs	year from buying	years from buying	ence page
Check battery liquid level.				○									69
Drain of the fuel tank				○									69
Change engine oil	*□				□								70
Replace engine oil filter cartridge	*□					□							71
Check for fan belt tension and adjust as necessary.						○							72
Clean and check air cleaner element, and change if necessary.				*○		○			□				73
Change, check and replenish oil in front/rear axle differential case.			*□					○	□				72
Change hydraulic oil.			*□						□				76
Change LST oil filter cartridge								□					74
Change return filter cartridge								□					74
Change suction filter			*□						□				76
Change fuel filter cartridge.								□					75
Check alternator Starter motor.										○			77
Change cooling water				Twice a year (Spring and Autumn)									79
Check and change radiator hose and loosen band.						○						□	72 78
Change fuel pipe												□	78
Change rubber hose in hydraulic system.												□	78
Check and retighten the wheel bolts in the first 100 hrs, after exchanging tires.							○						80
Check the damage of electrical circuit and the looseness of the coupler.												○	—

○: Check and replenish *□: Replace for the first time □: Replace *○: Check and clean for the first time

Every 50 Service Hours

■ Checking Battery Electrolyte Level

- (1) Check the battery electrolyte level, if it does not reach the required level, add distilled water.
When the battery fluid level falls below the lower limit, it is indicated by the lighting of a lamp on the operation monitor on the panelboard.
- (2) Clean the battery ventilation port and the battery.

IMPORTANT:

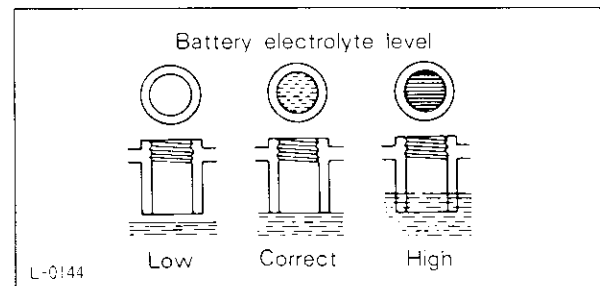
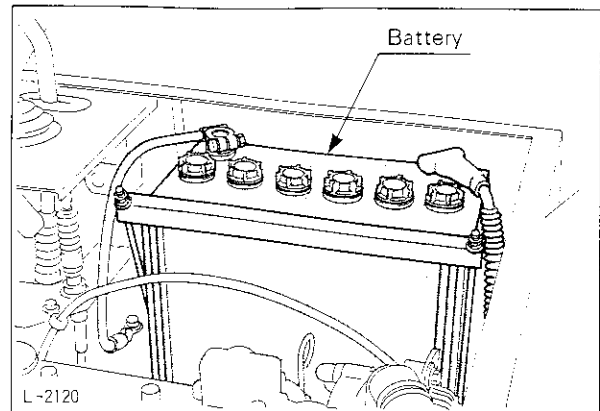
- When refilling dilute sulfuric acid solution, do not use a metal funnel. Handle sulfuric acid with extreme caution and do not get any on your skin or clothing.



CAUTION

To avoid personal injury:

- Do not allow the battery liquid to contact your skin or clothes.
Wash away any spilled battery liquid with water as soon as possible.



■ Draining of the Fuel Tank

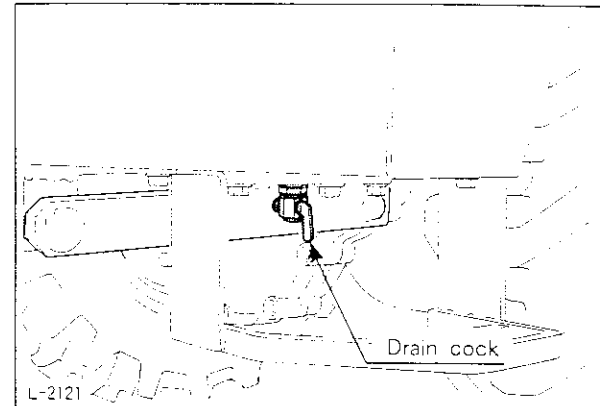
- (1) Slightly open the drain cock on the tank bottom to discharge water that has accumulated in the bottom.
- (2) After draining, be sure to shut the cock completely.



WARNING

To avoid personal injury:

- (1) Always stop the engine before draining.
- (2) Keep sparks and flames away from the fuel while draining, or serious personal injury results.

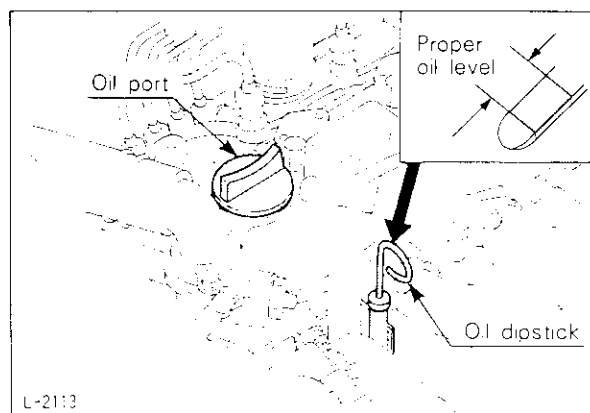
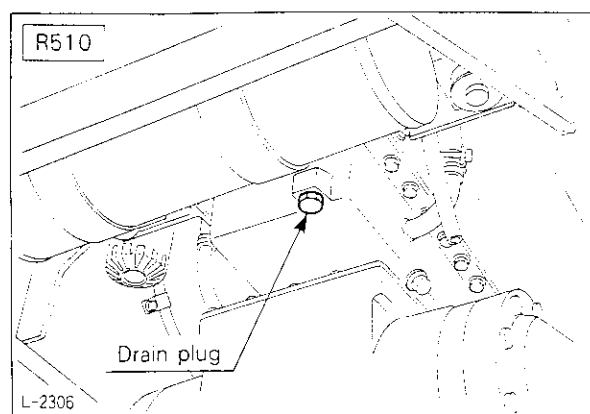
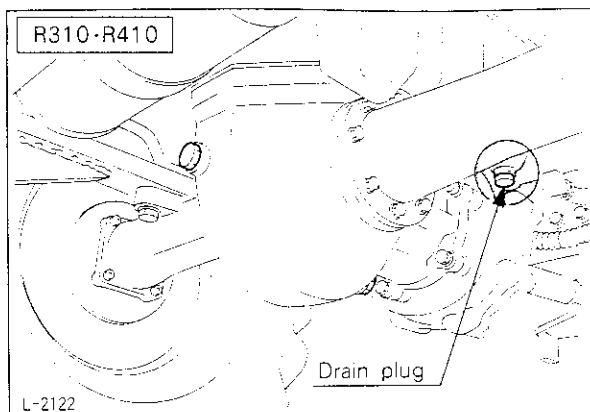


 Every 100 Service Hours

When performing inspection and servicing for every 100 hours of operation, perform inspection and servicing for every 50 hours at the same time.

■ **Changing Engine Oil (change it after first 30 hours of operation.)**

- (1) Remove the drain plug on the bottom of the engine, and drain all the old oil.
[The opposite side of the hexagon bolt: 22 mm]
- (2) Then retighten the plug completely.



- (3) Apply engine oil from the oil port to the correct level.
- (4) Idle the engine. About 5 minutes after stopping the engine, check with the oil level gauge to make sure the proper amount of engine oil has been supplied.



WARNING

To avoid personal injury:

- (1) Always stop the engine before changing the engine oil.
- (2) Never open the drain plug immediately after the engine has stopped, or hot engine oil may rush out, causing scalding.

IMPORTANT:

- (1) Use engine oil of appropriate viscosity according to ambient temperature. (See page 87)
- (2) Drain the engine oil once every 6 months regardless of the running time on the machine.

Every 200 Service Hours

When performing inspection and servicing for every 200 hours of operation, perform inspection and servicing for every 50, 100 hours at the same time.

■ Replacing Engine Oil Filter Cartridge (change it after first 35 hours of operation.)

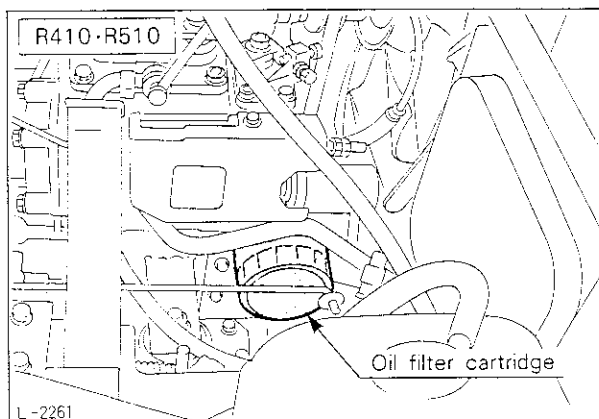
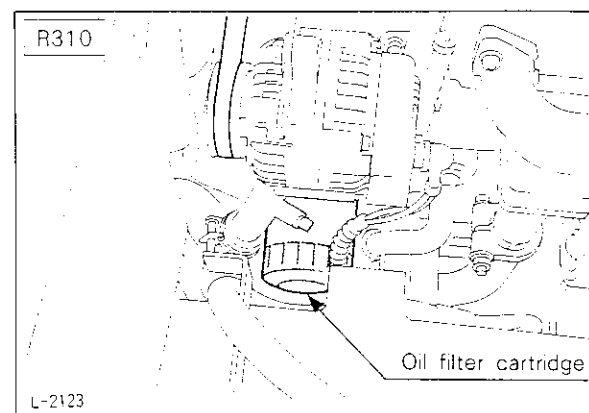
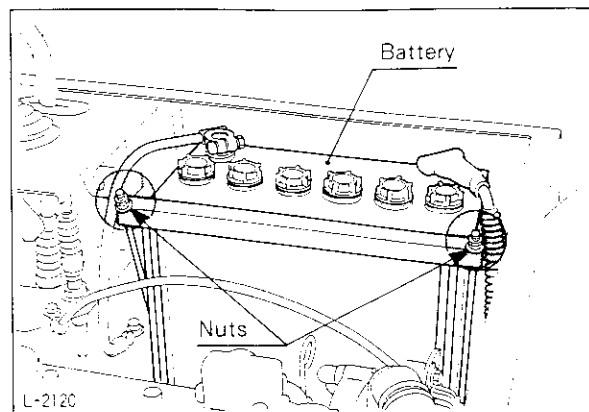
- (1) Replace the engine oil filter cartridge at the same time engine oil is changed (Part No. 16271-3209-0).
- (2) Loosen the nuts.
Remove the battery.
- (3) Use the supplied filter wrench to remove the engine oil filter cartridge.
- (4) Apply a thin layer of oil over the O-ring of the new filter cartridge and firmly tighten it in place by hand.
- (5) Add the engine oil to the specified level.
- (6) Restore the battery to its original position and secure it firmly.
- (7) Run the engine for about 5 minutes and stop the engine after confirming that the oil level indicator lights normally.
- (8) Check the oil level again. If the oil level is low, add an additional amount of oil.

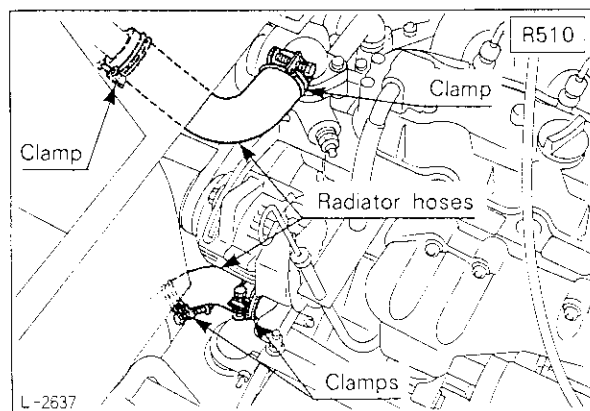
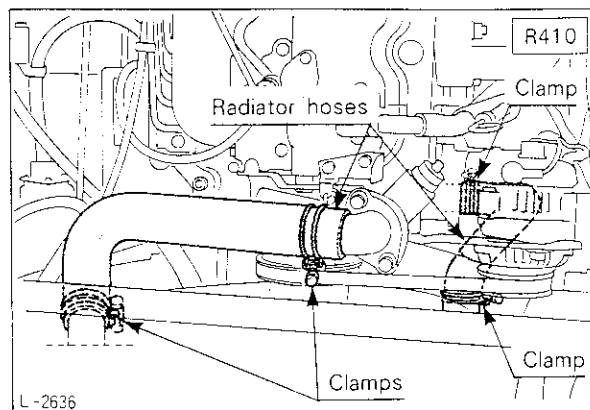
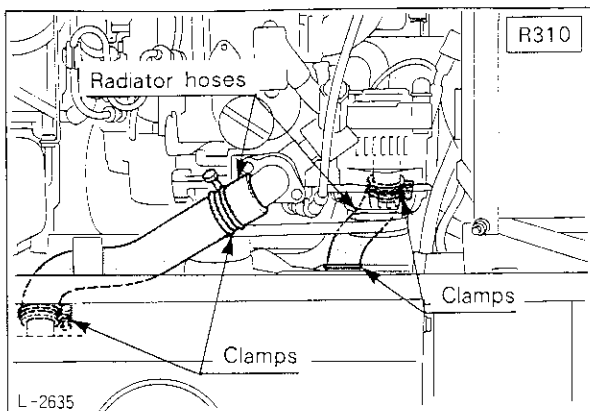
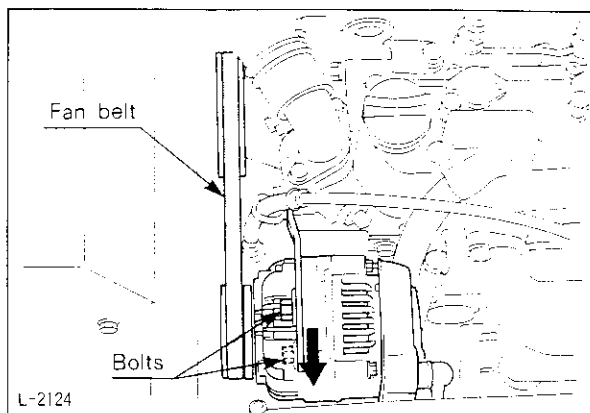


WARNING

To avoid personal injury:

- (1) Always stop the engine before replacing the oil filter.
- (2) Never remove the oil filter immediately after the engine has stopped, or hot engine oil may rush out, causing scalding.





■ Checking and Adjusting Fan Belt Tension

- (1) Press the fan belt in the middle with a fingertip by a force of about 5 kg (11.0 lbs). The belt tension is proper if the belt deflects about 7 mm (9/32"). If the tension is improper, adjust by loosening bolts and shifting alternator in the direction of the arrow.
- (2) Check the pulleys and the V-belts for damage and wear.
Carefully check to see if the V-belts fit snugly into the V-belt grooves.
- (3) If the V-belt has been stretched too much, nicked or cracked, replace it.



WARNING

To avoid personal injury:

- Do not place head, body, limbs, feet, fingers or hands near a rotating fan or belts.

IMPORTANT:

- (1) If the engine is run with a loose fan belt, the belt may slip, causing engine overheat or insufficient battery recharging.
Always keep the fan belt properly tightened.
- (2) If the fan belt should break, the battery charge lamp lights up.
Immediately stop the engine.

■ Checking Radiator Hoses (water pipes)

Check to see if radiator hoses are properly fixed every 200 hours of operation or six months, whichever come first.

- (1) If clamp bands are loose or water leaks, tighten bands securely.
- (2) Replace hoses and tighten clamp bands securely, if radiator hoses are swollen, hardened or cracked.

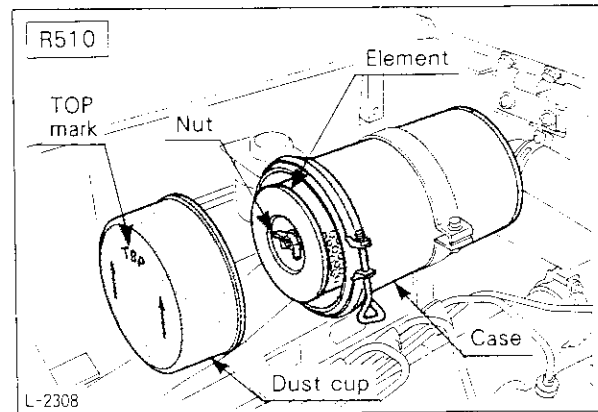
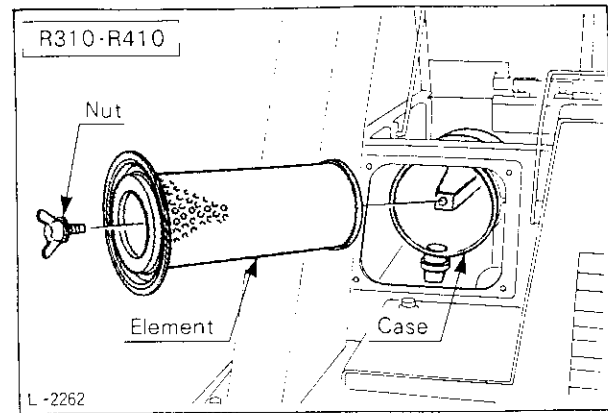
■ Cleaning and Checking Air Cleaner Element

◆ R310·R410

Remove rear hood cover, loosen the wing nut, take out element, clean the element and case interior and reassemble.

◆ R510

Open the hood, and remove the dust cup. Remove the wing nut, and take out the element. Then, clean the element, the dust cup, and the interior of the case. At reassembly, take care to install the dust cup so that its TOP mark faces up-wards.



■ Maintenance of the Air Filter

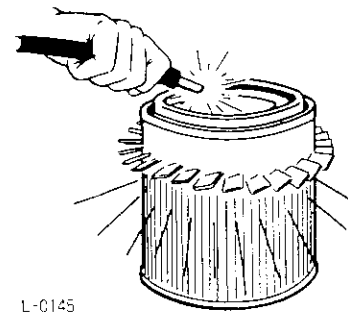
The quickest and surest maintenance is to replace the paper cartridge. Needless to say, this method depends on how well the replacement cartridge is. As another way of maintenance, there are different methods of cartridge cleaning.

◆ Blowing with compressed air

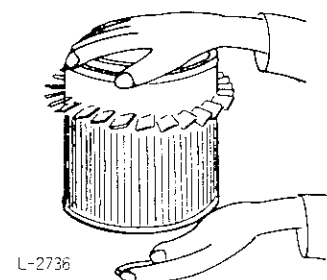
The pressure should not exceed 5 bar and the cartridge should be blown clean from inside to outside until the dust deposits are remarkably reduced.

◆ Knocking out

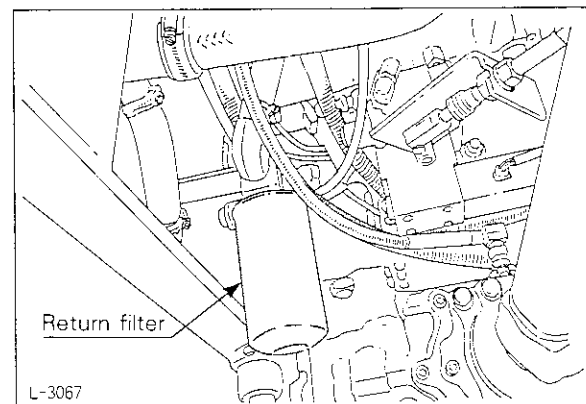
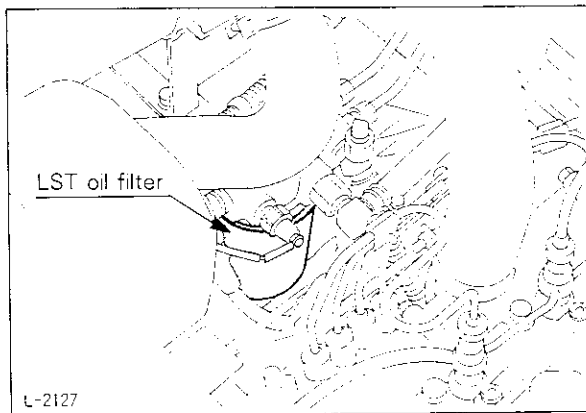
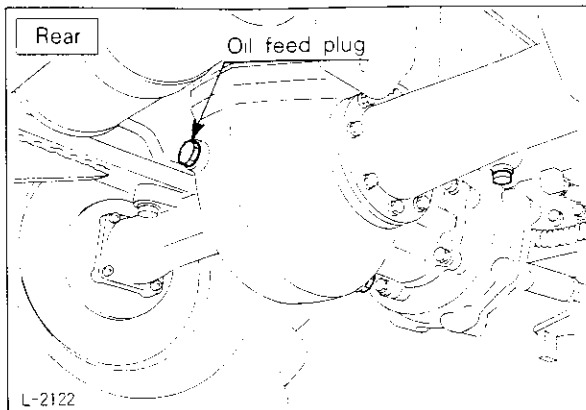
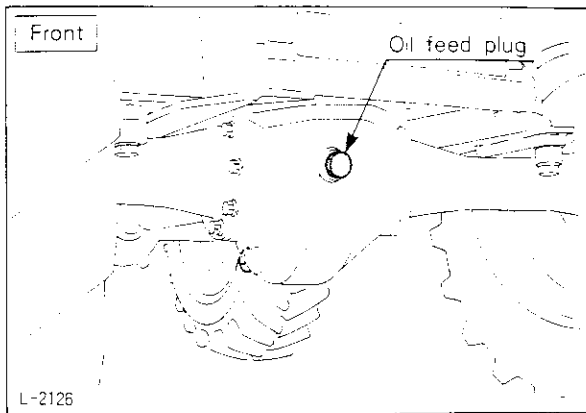
Gently knock out the cartridge with your ball of the thumb or an automobile tire to get rid of dust. Use this method in emergency cases only, because the cartridge might be damaged and its cleaning capability might be adversely affected. This method is suitable only for some kinds of contaminants that are not sticky. After the cartridge has been cleaned either way, it is necessary to check to see if its sealings and paper bellows are not damaged before reusing it. To check, just insert a light source (pen light) through the center tube and examine the cartridge from outside. Light leak means breakage. Even if a light leak is very small, it is not allowed to reuse the damaged cartridge.



L-C145



L-2736



Every 500 Service Hours

When performing inspection and servicing for every 500 hours of operation, perform inspection and servicing for every 50, 100 and 200 hours at the same time.

■ Checking and Replenishment Oil in the Front/Rear Axle Differential Cases

- (1) Remove the plug for checking oil level and refilling oil and check that the oil level is equal to the lower rim of the plug hole. [The plug is a hex bolt whose across-the-flats is 27 mm].
- (2) Add oil if necessary.
- (3) After inspection or replenishment, be sure to re-tighten the plug completely.



WARNING

To avoid personal injury:

- (1) Before changing oil in the front and rear axle differential case, always stop the engine, lock the shuttle change lever in neutral, and set the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) to the parking P position.
- (2) Always use the lift arm support device when servicing the machine with the loader lift arms raised to avoid serious personal injury.

■ Replacing LST Oil Filter and Return Filter

- (1) Loosen the filter with a filter wrench and remove the filter.
- (2) When fitting the new filter, apply a light coat of hydraulic oil to the gasket.

	Filter cartridge Part No.
R310(B) · R410(B) · R510	68841 - 6228 - 0

	Filter cartridge Part No.
R310(B) · R410(B)	68131 - 6213 - 0
R510	52200 - 1532 - 0

- (3) Tighten the filter about 2/3 turn by hand after its sealing face touches the gasket.



WARNING

To avoid personal injury:

- Never open the drain plug immediately after the engine has stopped, or hot hydraulic oil may rush out, causing scalding.

IMPORTANT:

- (1) After changing the filter, be sure to check the oil level.
- (2) Do not use a wrench to tighten the new filter since it can distort the filter. Be sure to tighten it by hand.

■ Changing the Fuel Filter

- (1) Close the fuel cock on the bottom of the fuel tank.
- (2) Remove the filter element with the supplied filter wrench, and replace it with a new one.
- (3) When fitting the new filter, apply a light coat of fuel to the O-ring and tighten it fully by hand.
- (4) Open the fuel cock.

(Filter element, Part No. 15221-4317-0)



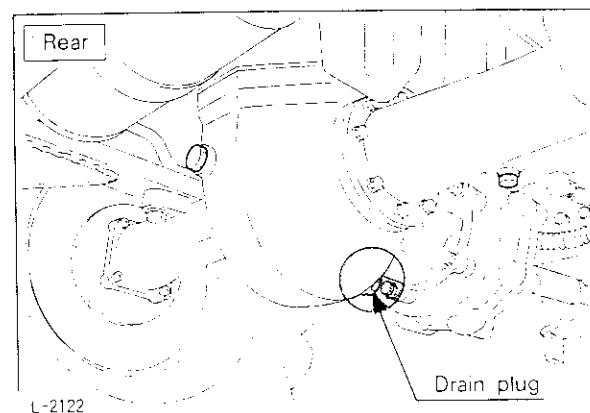
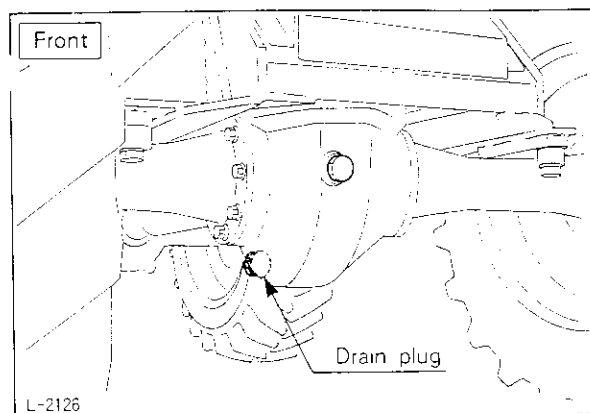
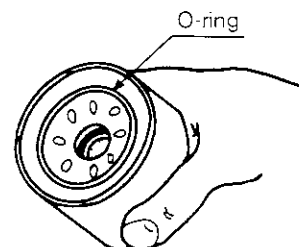
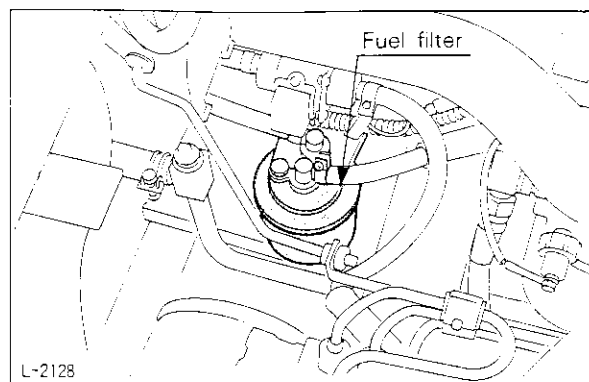
WARNING

To avoid personal injury:

- (1) Always stop the engine before changing the fuel filter.
- (2) Keep sparks and flames away from the fuel, or serious personal injury results. Allow the engine to cool completely.

IMPORTANT:

- Be sure to bleed air off the fuel system after changing the element.



Every 1000 Service Hours.

When performing inspection and servicing for every 1000 hours of operation, perform inspection and servicing for every 50, 100, 200 and 500 hours at the same time.

■ Changing Oil for the Front and Rear Axle Differential Cases (Change oil the first time after 1st 500 hrs. use.)

- (1) Remove the drain plug to discharge the oil.
[The drain plug has a hex hole whose across-the-flats is 10 mm]
- (2) After draining, be sure to tighten the plug completely.
- (3) Supply oil up to the oil port level through the oil port.

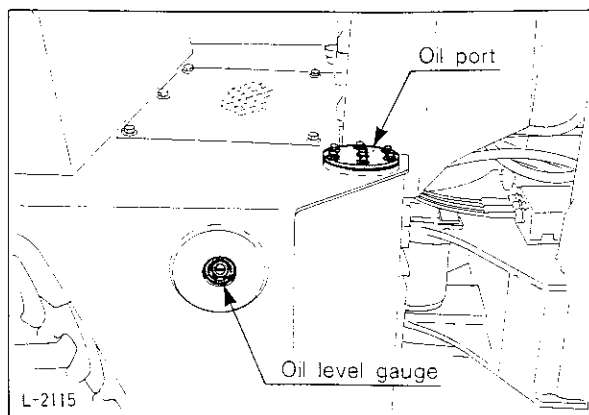
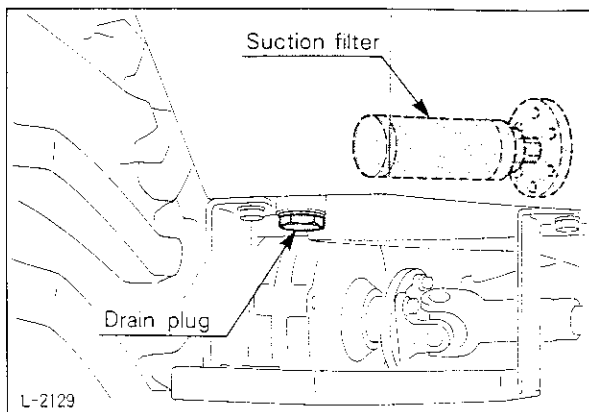
Type	Oil capacity		
	R310(B)	R410(B)	R510
Front	2.3 ℓ (0.61 U.S. gals)	7.3 ℓ (1.93 U.S. gals)	10.5 ℓ (2.77 U.S. gals)
Rear	4.3 ℓ (1.14 U.S. gals)	8.2 ℓ (2.17 U.S. gals)	10.5 ℓ (2.77 U.S. gals)



WARNING

To avoid personal injury:

- (1) Before changing oil in the front and rear axle differential case, always stop the engine, lock the shuttle change lever in neutral, and set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking P position.
- (2) Always use the lift arm support device when servicing the machine with the loader lift arms raised to avoid serious personal injury.



■ Changing Oil in Hydraulic Oil Tank and the Suction Filter.(after 1st 500 hrs. use)

- (1) Drain the oil by removing the drain plug from the bottom of the tank. Then retighten the plug completely.
[The drain plug is a hex bolt whose across-the-flats is 27 mm]
- (2) Remove the bolt from the tank bottom cover. Then remove the cover.
- (3) Remove the inner cover of the tank and replace the suction filter from the cover hole. Check the filter.
Wash or replace it if necessary.
-Filter mounting nut...50 mm long.

	Suction filter Part No.
R310(B) · R410(B)	68841-6218-0
R510	68881-6218-0

- (4) After replacing the filter, check the packing for scratches or damage, and replace filter if necessary.
- (5) Remove the oil port cover, refill the hydraulic fluid to the specified quantity and replace the cover.
- (6) Make sure that the oil port cover is securely fitted. Run the engine at low speed, set the shuttle change lever to the neutral position and repeatedly shift the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) from the parking \textcircled{P} position to the low \textcircled{L} (R310·R410) or to the drive \textcircled{D} (R510) and back to the parking \textcircled{P} for two minutes.
Then operate the bucket lever and the steering wheel for about five minutes.
Stop the engine and make sure that the oil quantity is sufficient through the oil level gauge.

Type	Specified oil quantity
R310(B)	20.0ℓ (5.28 U.S. gals)
R410(B)	33.5ℓ (8.85 U.S. gals)
R510	49.0ℓ (12.9 U.S. gals)



WARNING

To avoid personal injury:

- (1) Always stop the engine before changing oil.
- (2) Never open the drain plug immediately after the engine has stopped, hot hydraulic oil may rush out, causing scalding.

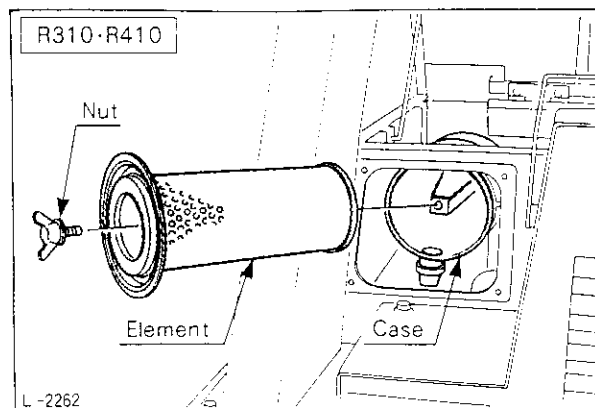
IMPORTANT:

- (1) If there are deposits in the tank, wipe them all with a clean rag and light oil.
- (2) Use great caution not to admit any foreign particles into the tank.
- (3) The oil level in the machine's hydraulic tank will vary when a backhoe is attached. Check the oil level through the oil gauge after attaching the backhoe.

■ Replacing Air Cleaner Element

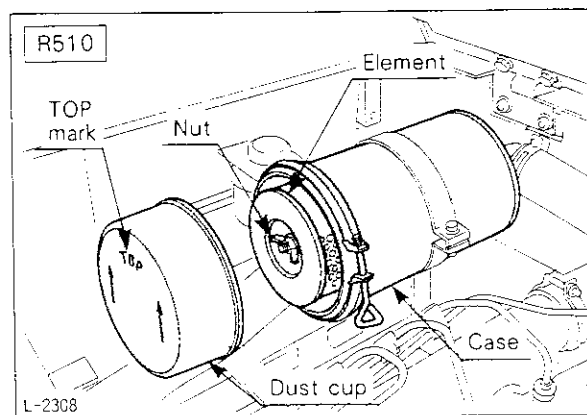
◆ R310-R410

Remove rear hood cover, loosen the wing nut, take out element, and replace it with a new one.
(air cleaner element Part No. 15741-1108-0)



◆ R510

Open the hood, and remove the dust cup. Remove the wing nut, and take out the element. Substitute a new element, being careful to install the dust cup so that its TOP mark faces upwards.
(air cleaner element Part No. 15606-1108-0)



Every 2000 Service Hours

When performing inspection and servicing for every 2000 hours of operation, perform inspection and servicing for every 50, 100, 200, 500 and 1000 hours at the same time.

■ Checking Alternator Starter Motor

After every 2000 hours of use, check and maintain the alternator. It is just about the time the brushes would become worn, ask the KUBOTA dealer for repairs. The motor has been made drip-proof so moisture will not penetrate into the motor. It would be best to ask the dealer to make repairs.

If the headlights are often used for work in the evening, inspect the alternator and starter motor every 1000 hours.

Every two Service Years

When performing inspection and servicing for every two service years of operation, perform inspection for every 200 hours at the same time.

■ Checking and Replacing Fuel Pipe and Rubber Hoses.

Inspection and replacement of lines. Rubber parts like the fuel lines are likely to age even if the engine is not used regularly. Therefore, it is necessary to replace these parts with new ones once every two years or sooner if they are damaged.

- (1) Occasionally check that the lines and clamps are not loose or damaged.
- (2) When the fuel line has been replaced, be sure to bleed air from the line.

**WARNING**

To avoid personal injury:

- (1) **A broken fuel line will cause fuel to leak. Be sure to check the line. Fire or injuries may result if a fuel line is leaking.**
- (2) **Make sure the engine is cool before disconnecting dry fuel lines.**

IMPORTANT:

- When replacing the fuel pipe, take special care to prevent dirt and other foreign matters from entering the pipe or the injection pump. Entry of foreign matter in these parts will likely cause the injectic pump to malfunction.

■ Replacing Radiator Hoses (water pipes)

Replace hoses and clamp bands every 2 years or earlier if checked and found that hoses are swollen, hardened or cracked.

■ Changing Cooling Water

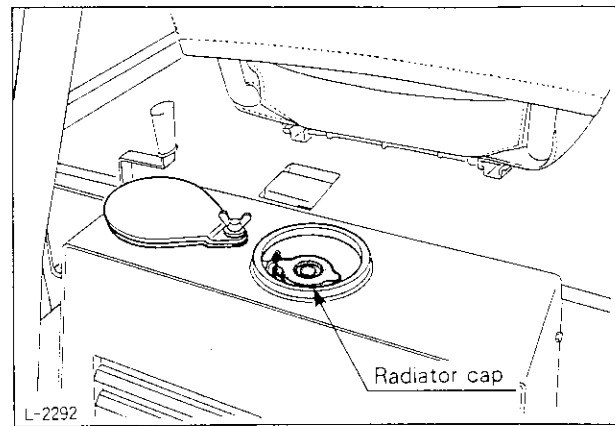
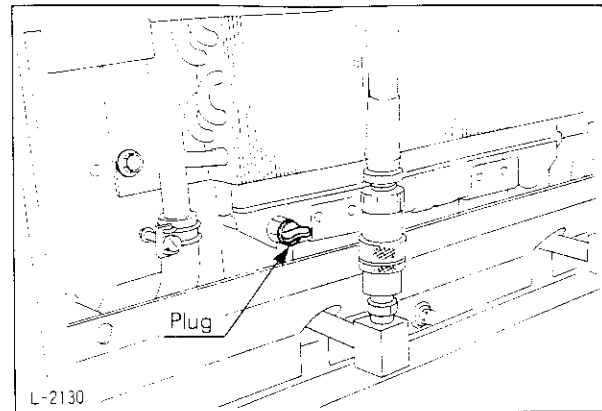
- (1) Remove the radiator grill and open the plug under the radiator to drain the cooling water.
- (2) To drain the reserve tank, disconnect the pipe at the bottom of the reserve tank.
- (3) Clean the radiator interior by pouring water at the supply port and keeping the plug open until clean water flows out of it.
- (4) Close the plug and fill the radiator and reserve tank with coolant. After filling, idle the engine for about five minutes, stop the engine and make sure that the coolant level is above the radiator core tubes.



WARNING

To avoid personal injury:

- Never open the plug immediately after the engine has stopped, or hot coolant may rush out, causing scalding.



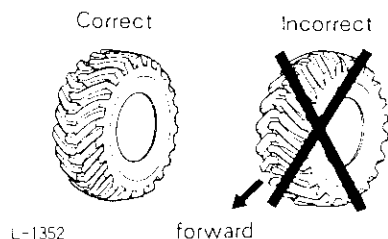
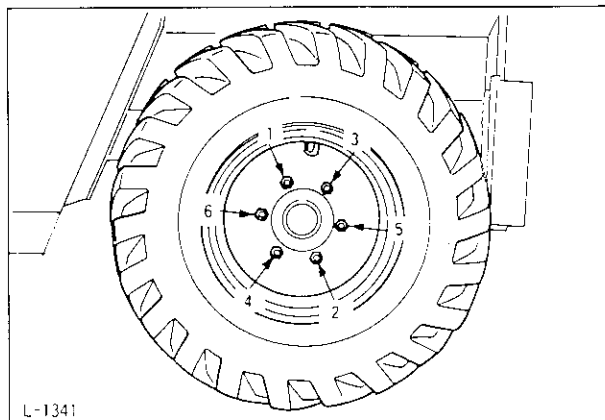
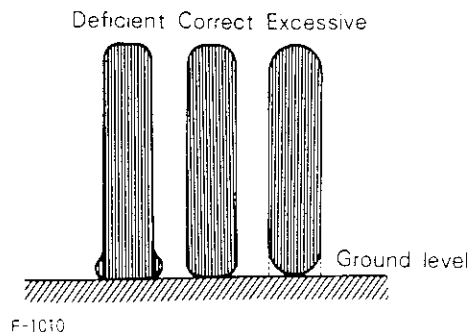
■ Handling Tires



WARNING

To avoid personal injury:

- (1) Before handling tires, stop the engine, set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking (P) position, lower the bucket and attachment to the ground, lock all control levers in neutral, and remove the key.
- (2) When raising the tire, block up the chassis for safety.
- (3) Before adding air, have the tire correctly installed on the machine or put the tire in a retaining device (tire inflation cage). Explosive separation of the tire can cause serious injury.



■ Conservation of Tires

If the air pressure in the tire is too high or too low, the life of the tire would be shortened.

Make routine checks of the air pressure in tires, and adjust so the pressure is correct.

Always measure the tire pressure, and check for damage to the tires or rims before starting operation.

◆ Tire pressure

Type	R310(B)	R510	R410(B)
Tire size	10-16.5-4PR	15.5-70-18-8PR	12.5/70-16-6PR
Front tire	0.22±0.01 MPa	MPa	0.20±0.1 MPa
	2.2±0.1 kgf/cm ²		2.0±0.1 kgf/cm ²
	31.2±1.4 psi		28.4±1.4 psi
Rear tire	0.22±0.01 MPa	MPa	0.20±0.1 MPa
	2.2±0.1 kgf/cm ²		2.0±0.1 kgf/cm ²
	31.2±1.4 psi		28.4±1.4 psi

(1) Insufficient tire pressure

Too small an amount of air in the tire can cause it to have excessive slack, which makes for faster wearing down of the tread.

(2) Correct tire pressure

(3) Excessively high tire pressure.

Too high a tire pressure causes the tractive force of the machine to decrease, or the tire to slip. There is also the risk of a blow out.

■ Changing Tires

◆ Removal

- (1) Loosen the hub bolts each by one turn on the tire to be removed.
- (2) Raise the tire off the ground, then loosen and remove the hub bolts and change the tire to a new one.

◆ Fitting

- (1) Mount tires to axle and lightly tighten the hub bolts.
- (2) Lower the tire to the ground, and tighten the hub bolts to the recommended torque in the order shown lefthand.

Type	R310(B)	R410(B) · R510
Tightening torque	167~196 N·m	363~402 N·m
	17~20 kgf·m	37~41 kgf·m
	123~145 ft·lb	268~297 ft·lb

■ Mounting the Tires

Lug tires are used to provide strong traction and buoyancy on soft ground. When mounting them, take care to position their tread pattern in the proper direction.

6.3 CHECKING AND HANDLING OF THE BATTERY



WARNING

To avoid personal injury:

- (1) Take care not to splash battery fluid on your skin or clothes. If it does splash on your skin or clothes, immediately wash it off thoroughly with running water.
If you do not wash off the battery fluid, diluted sulfuric acid may burn your skin or clothes.
- (2) Protect your eyes with glasses or goggles when working close to the battery.

■ Maintenance of Battery

How the battery is handled greatly affects the life of the battery.

When the batteries are mishandled and not properly cared for, the life will be considerably shortened.

Handle the battery correctly so as to obtain the most from the battery.

- (1) The battery of the engine is absolutely necessary for starting the engine, the electric source for the lights, etc.
- (2) When the battery becomes discharged, it would become difficult to start the engine and the lights would become dim.
The battery should be charged before it becomes completely discharged.
- (3) In a battery, water in the electrolyte will evaporate during the charging procedure. When there is shortage of electrolyte, the battery would be damaged. If the electrolyte is excessive, it will spill and damage the machine.
- (4) Check to see if the battery plate separators are above the electrolyte. If electrolyte is insufficient, add distilled water.
- (5) When the engine is to be stored for a long period of time, remove the battery from the machine, charge fully, adjust the electrolyte to the correct level, and keep stored in a cool, dry place.
- (6) Even during storage the battery will discharge, charge the battery once a month.

IMPORTANT:

- When replenishing dilute sulfuric acid solution, do not use a metal funnel. Handle sulfuric acid with extreme caution and do not get any on your skin or clothing.

■ Charging Battery



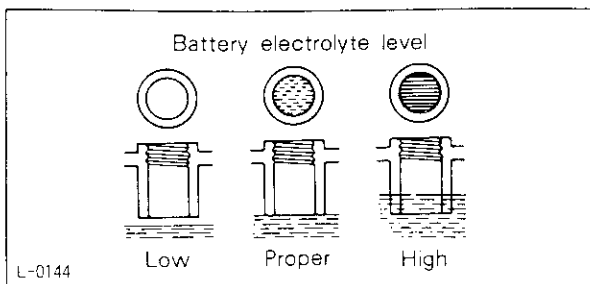
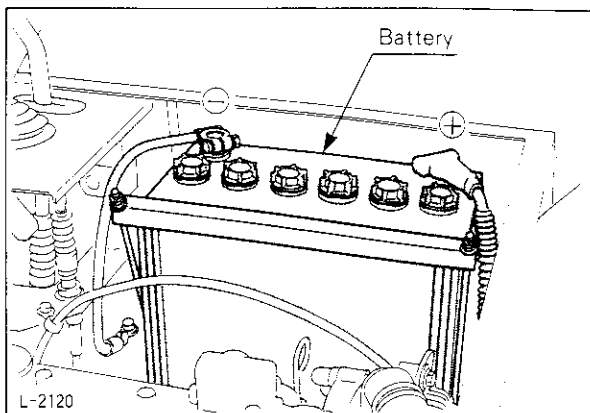
WARNING

To avoid personal injury:

- The charging generates gas, creating the danger of ignition or explosion. Be sure to keep all fire away and allow no sparks in the area. Remove all stoppers from all the cells.

IMPORTANT:

- (1) Avoid rapid charging as much as possible. This may shorten the battery's service life.
- (2) When charging the battery, connect the \oplus of the battery to the \oplus of the charger, and the \ominus of the battery to the \ominus of the charger. And charge in the ordinary way (long time charging). Slow charge is best.
- (3) Rapid charging method is the way of recharging the battery in a very short time with a large current. This method should be used only in emergencies.
- (4) Disconnect the battery cable before handling the battery except when checking the liquid level and specific gravity.
- (5) Clean the battery case with a solution of baking soda and water and waste rags. Discard rags after use.



■ Checking Battery Electrolyte Level

Remove the cap and check the battery electrolyte level. If it does not reach the prescribed level, add distilled water.



CAUTION

To avoid personal injury:

- Before inspecting or dismantling the battery, be sure to stop the engine and turn off the starter switch. Never remove the battery cap while the engine is running.

■ Charging a Battery still Mounted beside the Engine (Only in emergency conditions)

Normally, remove the battery from the machine.

IMPORTANT:

- (1) Before charging, disconnect the cable from the negative terminal of the battery.
Otherwise the alternator may be applied with abnormal voltage and be damaged.
- (2) When charging, remove all vent caps.
- (3) If the battery becomes overheated [will the liquid temperature exceeding 45°C (113°F)], temporarily stop charging.
- (4) When the charge is completed, stop operation immediately.
If charging is performed too long, the following problems may develop.
 - Overheating of the battery.
 - Reduction in the battery liquid level.
 - Damage to the battery.
- (5) When connecting the battery, be careful of its polarity.
Otherwise the alternator and other parts may be damaged.
- (6) It should be added here that if the engine is started in this way, after work is finished and as soon as possible the battery should be correctly and fully charged using a slow charging method.

■ Starting the Engine with a Booster Cable



CAUTION

To avoid personal injury:

- To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the ground cable is attached to the negative terminal.

- (1) Since the battery generates flammable gas, fire or sparks around the battery may cause an explosion.
Therefore, it is best not to start the engine with a booster cable.
- (2) When the battery nears the end of its service life, replace it quickly to prevent any problems from developing. If booster cable must be used to start the engine, handle the battery as follows.

◆ Before connection

- (1) The booster cables and clips should be identical to the battery in capacity.
- (2) Make sure that the terminals of the cables, clips and battery are properly connected and are not corroded.
- (3) Make sure that the start switch is off.
- (4) The battery of the two vehicles should have the same capacity.

◆ Connecting the booster cables

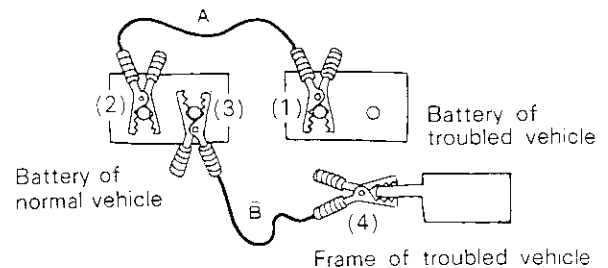
- (1) Connect the clip of booster cable A to the positive terminal of the troubled vehicle and the other end to the positive terminal of the normal vehicle.
- (2) Connect the clip of booster cable B to the negative terminal of the normal vehicle and the other end to the body of troubled vehicle.
The clip should be connected to the body away from the battery.
- (3) Before starting the engine, make sure that booster cables are properly connected.

◆ Starting the engine of the troubled vehicle.

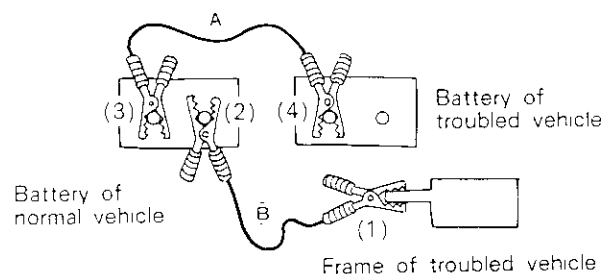
- (1) After confirming the connection, start the engine.
- (2) If the engine fails to start, wait 2 or 3 minutes before trying again.

◆ Disconnecting the booster cables.

- (1) Disconnect the clip of booster cable B from the body of the troubled vehicle and the other end from the negative terminal of the normal vehicle.
- (2) Disconnect the clip of booster cable A from the positive terminal of the normal vehicle and the other end from the positive terminal of the troubled vehicle.



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6.4 PERIODIC PARTS REPLACEMENT

To ensure safety at all times, it is important to inspect and maintain the engine on a regular basis. For further safety, it is strongly recommended to periodically replace the following parts which are most essential to safe operation. These parts tend to wear out or deteriorate with time and it is often difficult to determine their condition by periodic inspection. Therefore, even if no defect is found, they should be replaced at certain intervals to maintain their safe operation.

If any defect is found before the specified time, immediately replace or repair the part. Please understand that such periodic replacement is not covered by the maker's warranty.

Periodic parts of replacement	Replacement intervals
1 Brake rubber hose	every year
2 Rubber parts (piston packing of brake master cylinder etc.)	every two year
3 Brake fluid (Hydraulic oil ISO VG 32)	every two years
4 Fuel lines	every two years
5 Oil pressure hose for steering cylinder	every two years
6 Packing of steering cylinder, seal O ring	every four years

6.5 LONG STORAGE

◆ **Before storing the machine for long periods of time, do the following:**

- (1) Wash and clean each part of the machine, and store the machine indoors: never leave it outdoors. If it must be stored outdoors, choose a flat place, lay planks, park the machine, and cover it completely.
- (2) Add oil and grease, and change oil.
- (3) Apply grease sufficiently to the piston rods of the oil pressure cylinders where they are exposed.
- (4) Remove and store the battery separately.
- (5) If there is possibility that temperature may drop below 0°C (32°F) during storage, add anti-freeze to the cooling water, or drain the cooling water completely.
- (6) Run the engine, drive the machine for a short distance, and operate the lift arm, bucket and backhoe.
- (7) At the same time, recharge battery.



WARNING

To avoid personal injury:

- **While storing, do the following.**

Stop the engine, set the Hi-Lo shift lever (R310·R410) or the parking brake lever (R510) to the parking (P) position, lower the bucket and attachment to the ground, lock all control levers in neutral, and remove the key.

◆ **When using equipment that has not been used for a long time, follow the procedure below.**

- (1) Remove the grease applied to the hydraulic cylinder rod.
- (2) Run the engine with no load until the attachment drive system and the travel system have been thoroughly lubricated.

6.6 CAUTION WHEN WASHING THE MACHINE

Wash the machine after stopping the engine. If you wash the machine while running the engine, splashing water will get into the air cleaner through its intake and cause engine trouble. Carefully, wash and do not splash water over the air cleaner.

6.7 CHECKING THE ELECTRICAL SYSTEM, HANDLING FUSES

The damage of electrical wiring and looseness of the coupler cause the electrical components to malfunction and also lead a short circuit, leakage and burn-out. Replace and repair as quickly as possible.

■ Replacing the Fuses

- (1) Remove the cover of the fuse box.
- (2) Replace the blown fuse using a new one of the same capacity.

■ Fuse Capacities and Their Circuits

No.	Capacity	No.	Capacity
①	15A	④	10A
②	10A	⑤	10A
③	10A	⑥	15A

Spare fuses are provided on the new machine.
(1-piece for each capacity (15A 10A))

IMPORTANT:

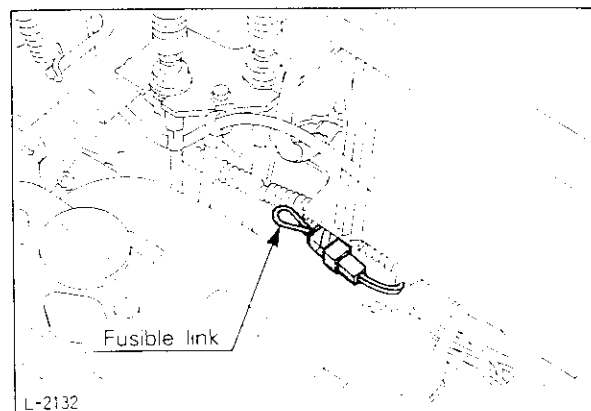
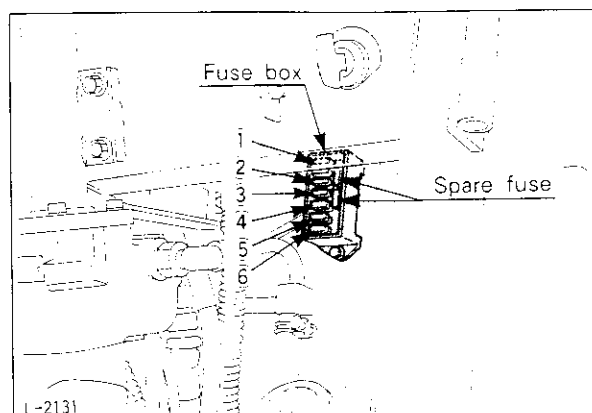
- Fusible link also protects the electrical circuit. If the fuse or fusible link has blown, determine why it blew and make any necessary repairs.
In replacing, never use any substitutes for it but a new one of the same capacity.
(Fusible link: Part No. 38430-3453-0)



CAUTION

To avoid personal injury:

- Before replacing a fuse, be sure to turn off the start switch.



7. ADJUSTMENTS AND CHANGING

7.1 BLEEDING THE FUEL SYSTEM

After the engine has been run until no fuel is left in the fuel tank, the engine cannot be started again after refueling. This is because air has entered the fuel pump, making fuel injection impossible. It is thus necessary to bleed the fuel system in the following manner (do the same after replacing the fuel filter):

- (1) Fill the fuel tank with fuel.
- (2) Turn the starter switch one notch clockwise.
Thus the fuel pump starts working to supply fuel into the line.

- (3) About 10 seconds later, the air will be bled from the line. Then the engine is ready for starting.



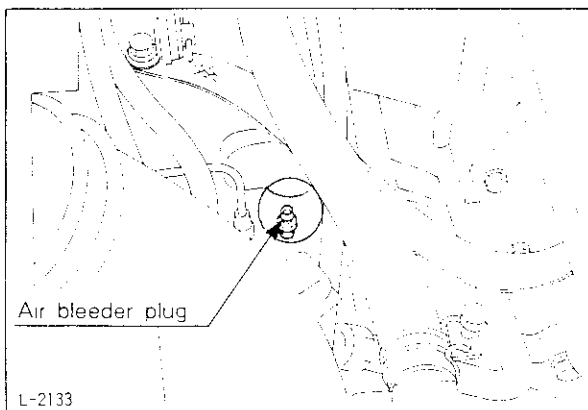
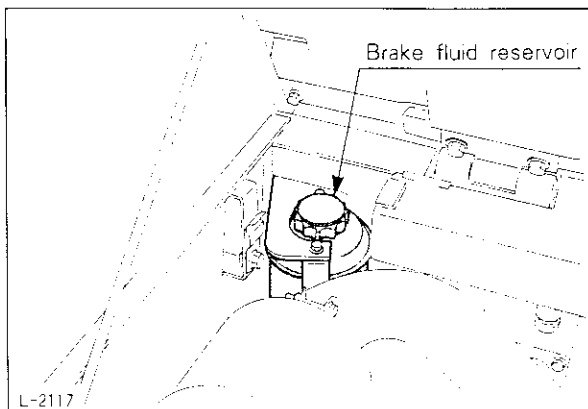
WARNING

To avoid personal injury:

- Keep sparks and flames away from the fuel, or personal injury may result.

NOTE:

- The engine may sometimes stall after starting if air bleeding was not complete. If this should occur, repeat steps (2) and (3).



7.2 BLEEDING AIR FROM THE BRAKE FLUID SYSTEM

Bleed the air from the brake circuit after disassembling and repairing the brake or when the brake fluid falls too low, allowing air inside the brake system. (This operation requires two workers.)

- (1) Fill the brake fluid reservoir with hydraulic oil ISO VG32.

Make sure that the brake fluid reservoir is always half full or more during air-bleeding

- (2) Remove the cap from the air-bleeding plug cated on brake housing, connect a vinyl tube about 1 meter long to the plug and place the other end of the tube in an oil reservoir.
- (3) Loosen the plug with a wrench and press the brake pedal gradually to bleed the air. Repeat this procedure until bubbles no longer emerge from the tube, then slowly release the brake pedal.
- (4) If air is not fully bled by one operation, repeat step (3).
- (5) After the bubbles are completely removed, retighten the plug and replace the cap.
- (6) Refill the brake fluid reservoir with hydraulic oil to the specified level.



WARNING

To avoid personal injury:

- (1) For above procedure, stop the engine, set the Hi-Lo shift lever (R310-R410) or the parking brake lever (R510) to the parking P position, lower the bucket and attachment to the ground, lock all control levers in neutral, and remove the key.
- (2) Only use hydraulic oil that meets ISO VG 32. Use of incorrect oil will cause damage of brake parts and potential brake failure.

8. RECOMMENDED OILS

■ Select the Grade by Referring to the Table.

Replenish place	Kind of fuel, oil and water	Capacity (U.S. gal)			Viscosity No. classified by temperature:					
		R310(B)	R410(B)	R510	-20°	-10°	0°	10°	20°	30° (C)
Fuel tank	Light oil	26 (6.87)	43 (11.36)	60 (15.85)	Refer to recommended fuels					
Engine oil pan	Engine oil	4.3 (1.14)	7.5 (1.98)	6.0 (1.59)	SAE 10W			SAE 30W		
					SAE 10W 30					
Front axle differential case	Gear oil	2.3 (0.61)	7.3 (1.93)	10.5 (2.77)	SAE 80W					
Rear axle differential case	Gear oil	4.3 (1.14)	8.2 (2.17)	10.5 (2.77)	SAE 80W					
Hydraulic oil tank	Engine oil	20 (5.28)	33.5 (8.85)	49 (12.94)	SAE 10W 30					
Brake fluid reservoir	Hydraulic oil	0.3 (0.08)			Hydraulic oil ISO VG32					
Grease nipple	Grease				No. 0		No. 1		No. 2	
Radiator (Reserve tank)	Water	4.1 (1.08)	7.5 (1.98) 1.0 (0.26)	7.2 (1.90)				soft water		
					anti-freeze					

■ Recommended Oils

	coverage	viscosity grade	Shell	Mobil	Exxon	MIL standard
Engine oil	Winter time or for low temperature area	SAE 10W	Shell Rotella T 10W Shell Rimula 10W	Mobil Delvac 1310	XD-3 10W XD-3 Extra 10W	MIL-L-2104C MIL-L-2104D
		SAE 20W	Shell Rotella T20W-20 Shell Rimula 20W-20	Mobil Delvac 1320	XD-3 20W-20 XD-3 Extra 20W-20	
	Summer time or for high tempera- ture area	SAE 30	Shell Rotella T30 Shell Rimula 30	Mobil Delvac 1330	XD-3 30 XD-3 Extra 30	
		SAE 40	Shell Rotella T40 Shell Rimula 40	Mobil Delvac 1340	XD-3 40 XD-3 Extra 40	
		SAE 50	Shell Rimula 50	Mobil Delvac 1350	—	
	for all season	Multi- type	Shell Rotella T15W	—	XD-3 15W-40 XD-3 Extra 15W-40	
Gear oil	For all season	SAE 80W	Shell Donax TD	Mobiland Super Universal	—	MIL-L-2105C
Hydraulic oil	Winter time or for low temperature area	ISO 32	Shell Tellus T32	Mobil DTE Oil 13	NUTO H32	—
		ISO 46	Shell Tellus T46	Mobil DTE Oil 15	NUTO H46	
	Summer time or for high tempera- ture area	ISO 68	Shell Tellus T68	Mobil DTE Oil 16	NUTO H68	
Grease	—	—	Shell ALVANIA EP2	Mobilux EP2	BEACON Q2	—
Fuel	—	—	No.2-D (ASTM D975) grade light oil			—

NOTES:

- (1) It cannot be guaranteed against any problem caused by use of the fuel and lubricating oil and grease that are not specified.
- (2) While this information is from sources that Kubota believes to be reliable, Kubota Tractor Corp. assumes no responsibility for their accuracy.
- (3) Engine oil should be the MIL-L-2104C/2104D or should have the property of the API classification CC/CD grade. Gear oil should be the MIL-L-2105/2105C or should have the property of the API classification GL-4/GL-5 grade. Hydraulic oil and grease should be below mentioned ones or equivalent to them.

9. TROUBLESHOOTING


9.1 ENGINE TROUBLES AND REPAIRS

Trouble	Cause	Countermeasure
Starting is difficult.	Fuel is too viscous, and does not flow.	<ul style="list-style-type: none"> ● Check fuel tank and filter. ● Remove impurities and water. ● Clean the filter element if necessary, with oil. ● Use proper fuel for ambient temperature.
	Air and water in fuel feed system.	<ul style="list-style-type: none"> ● Remove water from fuel tank. ● Check fuel pipe coupling bolts and box nuts for looseness. (If air enters fuel filter and injection pipe, injection pump with malfunction.) ● For bleeding fuel system (fuel filter and injection pump), refer to "7.1. Bleeding fuel system".
	Thick carbon layer sticking to outer circumference of nozzle piece injection port.	<ul style="list-style-type: none"> ● Remove water from fuel system, and eliminate carbon, being careful not to scratch injection port and needle valve. (Carbon collects because of water or dirt in fuel.) ● Check nozzle piece, and replace with a new one, if necessary.
	Improper valve clearance.	<ul style="list-style-type: none"> ● With engine cold, adjust the clearance to the prescribed value
	Gas leaking through valve seat.	<ul style="list-style-type: none"> ● Fit the valve.
	Fuel injection mistimed.	<ul style="list-style-type: none"> ● Adjust injection timing.
	Oil viscosity too high causing sluggish performance.	<ul style="list-style-type: none"> ● Use oils of different viscosities depending on ambient temperatures.
	Insufficient compression pressure.	<ul style="list-style-type: none"> ● Replace valve, piston ring, piston or liner. (Extremely worn piston ring, piston or liner, or defective valve decreases compression.) ● Detach air cleaner, and add 5cc (0.3 cu.in.) of oil through inlet manifold.
Engine output is difficult.	Discharged battery	<ul style="list-style-type: none"> ● Recharge battery. ● In winter, be sure to remove the battery, fully recharge it, store it indoors after an operation is over, and install it only before starting operation.
	Carbon sticking to outer circumference of nozzle piece injection port.	<ul style="list-style-type: none"> ● Remove carbon, being careful not to scratch injection port and needle valve. ● Check nozzle piece, and replace with a new one if necessary.
	Insufficient compression pressure, or gas leaking through valve seat.	<ul style="list-style-type: none"> ● Replace valve, piston ring, piston or liner, (Extremely worn piston ring, piston or liner, or defective valve decrease compression). ● Detach air cleaner, and add 5cc (0.3 cu.in.) of oil through inlet manifold. ● Fit the valve.
	Fuel low.	<ul style="list-style-type: none"> ● Check fuel system.

Trouble	Cause	Countermeasure
Engine output is insufficient.	Engine seizing.	<ul style="list-style-type: none"> ● Check lubricating system. ● Check to see that oil filter functions normally. ● Remove impurities from fuel filter and filter element. (Impurities on fuel filter and filter element will diminish lubrication effect.) ● Check to see if bearing clearances are excessive.
	Fuel injection mistimed.	<ul style="list-style-type: none"> ● Adjust fuel injection timing.
	Valve timing wrong.	<ul style="list-style-type: none"> ● With engine cold, adjust valve clearance.
	Air cleaner clogged.	<ul style="list-style-type: none"> ● Clean the element every 200 hours of operation.
	Injection pressures improper.	<ul style="list-style-type: none"> ● Adjust pressure to prescribed level.
	Injection pump worn.	<ul style="list-style-type: none"> ● Use only quality fuel. ● Replace injection pump element and delivery valve assembly.
Engine suddenly stops.	Fuel runs short.	<ul style="list-style-type: none"> ● Check fuel level in tank and add fuel if necessary. ● Check fuel system for air.
	Nozzle defective.	<ul style="list-style-type: none"> ● Replace nozzle with a new one, if necessary.
	Engine seizing because of insufficient oil or poor lubricating effect.	<ul style="list-style-type: none"> ● Check engine oil level with oil level gauge. ● Check lubricating system. ● Check oil filter element for clogging, and replace with a new one if clogged. ● Check to see if bearing clearance are excessive.
Color of exhaust is abnormal.	Fuel injection limit system out of order.	<ul style="list-style-type: none"> ● Request your dealer to check it.
	Poor fuel used.	<ul style="list-style-type: none"> ● Change to quality fuel.
	Nozzle defective.	<ul style="list-style-type: none"> ● Replace with a new one, if defective.
	Incomplete combustion.	<ul style="list-style-type: none"> ● There are two causes : trouble in injection system, such as poor atomization and mistimed injection timing ; and compression trouble, such as compression leakage insufficient compression.
Engine must be stopped immediately.	Engine speed suddenly increases or decreases.	<ul style="list-style-type: none"> ● Check injection timing and fuel system.
	Abnormal noise suddenly heard.	<ul style="list-style-type: none"> ● Check each moving part carefully.
	Color of exhaust suddenly becomes abnormal.	<ul style="list-style-type: none"> ● Check fuel injection system, especially injection nozzle.
	Bearing hot.	<ul style="list-style-type: none"> ● Check lubrication system.
	Oil pressure alarm lamp lights up during operation.	<ul style="list-style-type: none"> ● Check lubricating system. ● Check to see if bearing clearances are excessive. ● Check action of relief valve in oil filter.
Engine Overheats	Engine overloaded.	<ul style="list-style-type: none"> ● Shift to lower gear or reduce load.
	Low coolant level.	<ul style="list-style-type: none"> ● Fill cooling system to proper level; check radiator and hoses for loose connections or leaks.
	Loose or defective fan belt.	<ul style="list-style-type: none"> ● Adjust fan belt.
	Dirty radiator core or grille screens.	<ul style="list-style-type: none"> ● Remove all trash.
	Coolant flow route corroded.	<ul style="list-style-type: none"> ● Flush cooling system.

NOTE: If there is any question, contact your Kubota dealer.

9.2 TROUBLES IN TRAVELING SYSTEM

Trouble	Cause	Countermeasure
Wheel loader does not travel properly. ● It does not start when speed change lever is operated.	<ul style="list-style-type: none"> ● Malfunction in LST control valve. ● Defect in electrical switch for shuttle change lever. ● Malfunction in LST pump servo-cylinder. 	● Contact Kubota dealer.
	Short of hydraulic oil.	● Add hydraulic oil to specified level, while checking the oil gauge.
	Not pressed accelerator pedal.	● Press accelerator pedal.
When LST filter warning lamp lights up except Hi-Lo shift lever (R310 - R410) or the parking brake lever (R510) at parking  position.	LST filter is clogging.	● Replace LST filter.
	Malfunction in relief valve on bypass line.	● Disassemble and clean.
Noise during traveling.	Loose bolt on universal joint or flange.	● Retighten.
	Improper meshing of differential gears.	● Readjust tooth bearing and backlash.
	Worn or damaged differential gear tooth surface.	● Disassemble, check and replace if necessary.
	Damaged differential gear bearing.	● Disassemble, check and replace if necessary.
Inefficient travel brake.	Air in brake system.	● Bleed.
	Oil leaks from master cylinder piston cup.	● Contact Kubota dealer.
	Damaged brake seal.	
Brake pedal does not return properly after being pressed.	Damaged in brake pedal return spring.	● Disassemble, check and replace if necessary.
	Master cylinder oil port is clogged.	● Contact Kubota dealer.
Unresponsive brake pedal.	Leaking brake fluid.	● Check and change fluid. Then bleed.
Parking brake insufficient.	Brake disc worn down.	● Check and replace if necessary.
Steering wheel is heavy to turn.	Oil leak inside steering control valve.	● Contact Kubota dealer.
	Misaligned steering shaft.	● Check and replace if necessary.
	Too much play in steering shaft spline.	
	Too much play in steering cylinder pin.	

9.3 TROUBLES IN OIL PRESSURE SYSTEM AND REPAIRS.

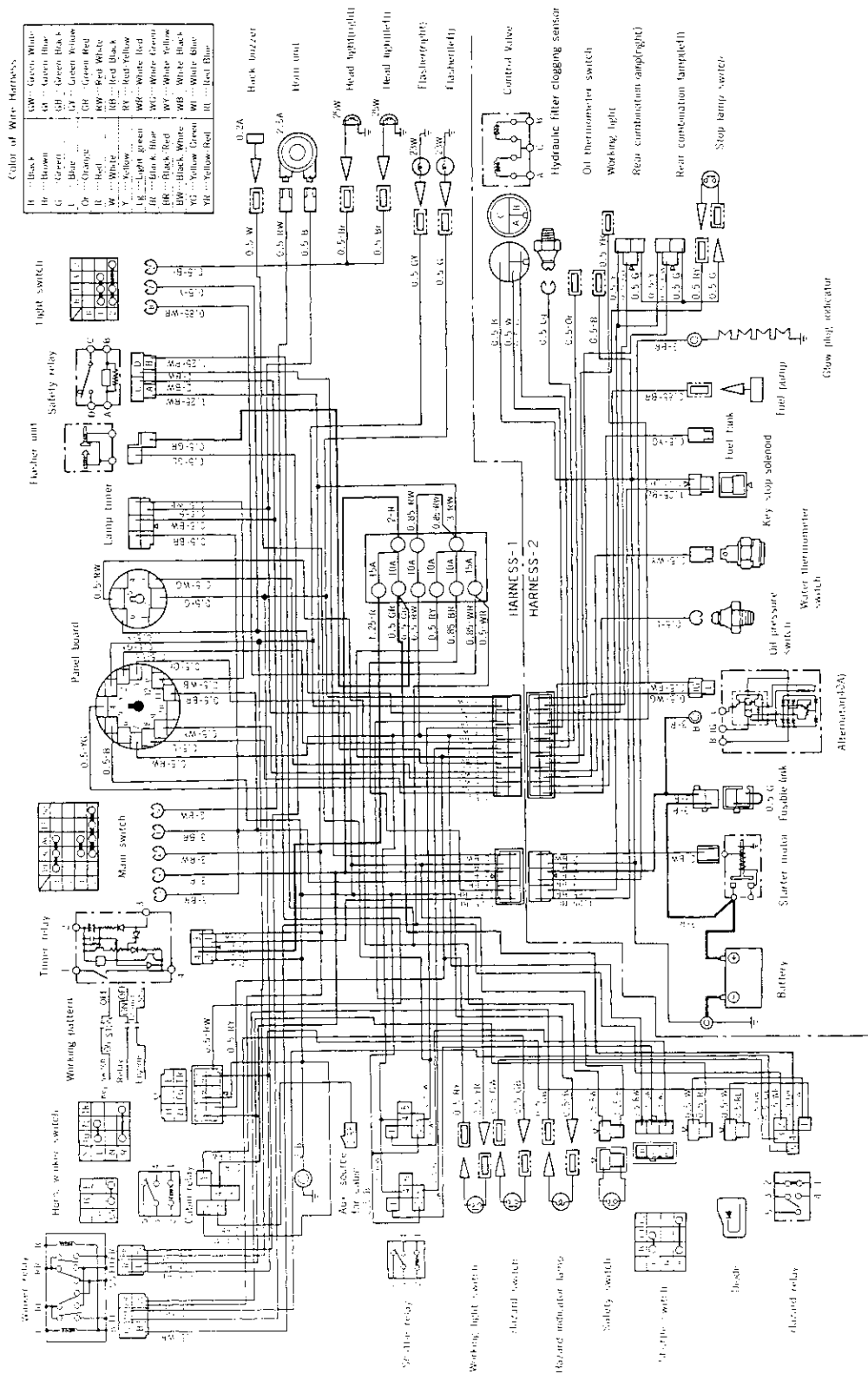
Trouble	Cause	Countermeasure
Bucket-lift malfunctioning	Pump coupling damaged.	● Check and replace, if necessary.
	Hydraulic oil low.	● Add oil.
	Air enters oil pressure system through inlet pipe joint.	● Check inlet pipe, and tighten joint bolt where air enters, or replace joint.
Bucket-lift lacks drive power and/or speed.	Efficiency decreased because of worn oil pressure pump.	● Check, and replace pump, if necessary.
	Preset pressure of relief valve lowered, or valve open.	● Check, adjust or replace valve.
	Hydraulic oil low or oil viscosity is improper.	● Add or replace oil. Be sure to use recommended oil.
	Air enters inlet pipe joint.	● Check inlet pipe, and tighten joint bolt where air enters, or replace joint.
	Oil leaks because of worn or damaged control valve spool.	● Check and replace assembly in trouble.
Bucket-lift lacks power or does not maintain strong holding power.	Internal oil leakage because of worn or damaged piston packing.	● Check piston packing, and replace if necessary.
	Oil leakage because of worn or damaged control valve spool.	● Check spool, and replace if necessary.
	Present pressure of port relief valve dropped.	● Check valve and adjust or replace.
Only one hydraulic action is unobtainable.	Oil leakage through rubber hose or piping joint.	● Replace hose or joint.
	Corresponding section in control valve not functioning because foreign matter caught.	● Check steering system, and repair. Check control valve, and repair.
	Control valve spool broken.	● Disassemble and check valve and replace corresponding part if necessary.
	Hose, piping or joint broken.	● Replace.
Operation of control lever causes wrong function to be effected.	Piping or rubber hose connected improperly.	● Connect properly.
Abnormal noise is heard	Hydraulic oil low.	● Add oil to correct.
	Air enters inlet piping or joint.	● Check piping or joint, and repair.
	Pipe, hose or joint deformed.	● Repair or replace.
	Reduction gear damaged. (in cold weather.)	● Disassemble and check gear, and repair or replace.

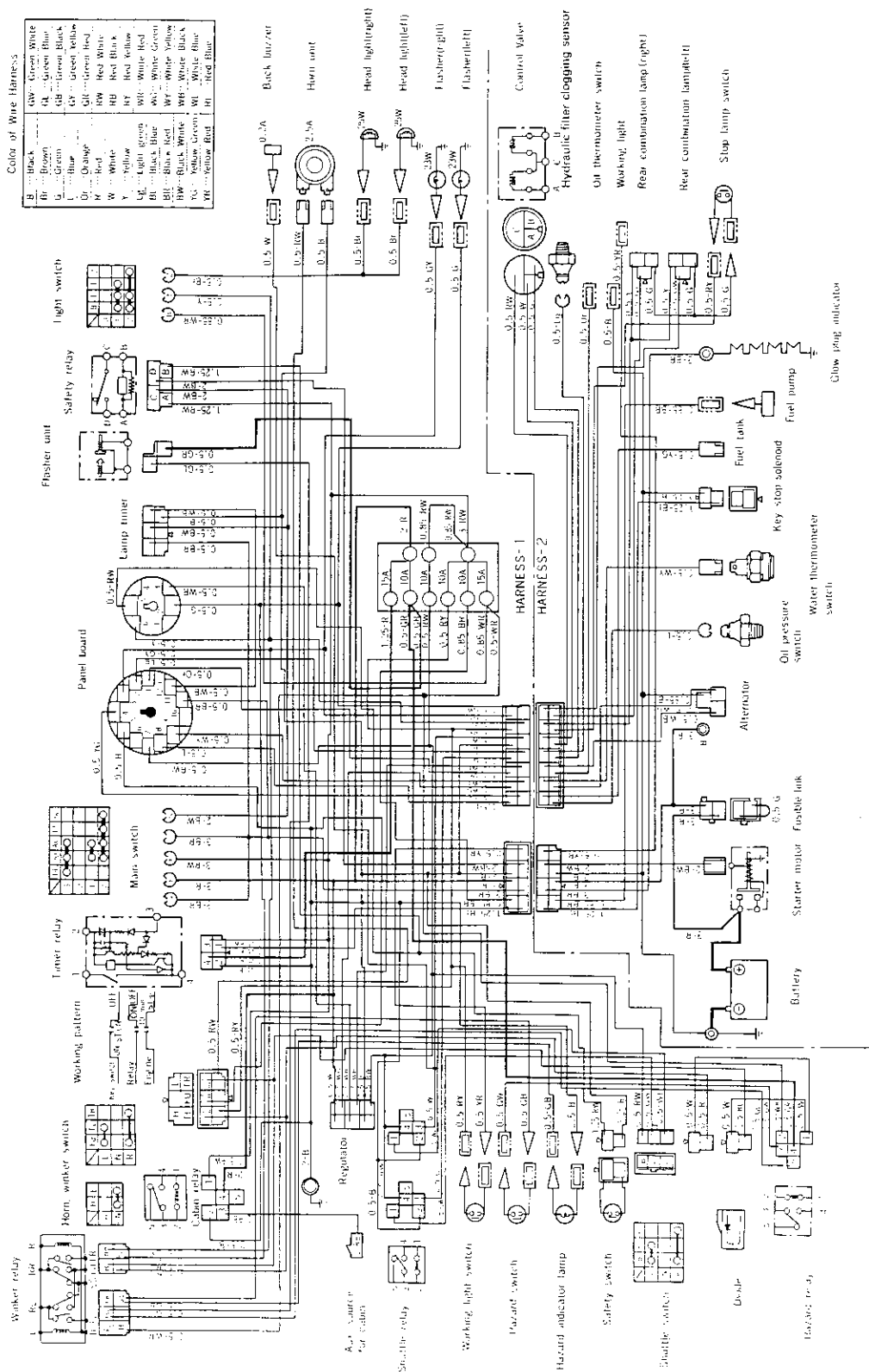
Trouble	Cause	Countermeasure
Hydraulic oil temperature increases.	Oil viscosity too high.	● Use correct oil.
	Relief valve pressure mis-adjusted.	● Adjust it correctly.
	Engine overloaded continuously.	● Stop operation.
	Pump or valve clearance too narrow.	● Check and clean pump or valve, and change oil.
	Control lever not returned to hold position when piston reaches end.	● Return lever to hold position.

9.4 BATTERY TROUBLES AND REPAIRS

Trouble	Cause	Countermeasure	Preventive measure
Starter motor does not start.	Battery has been used to point where battery charge lamp becomes dim.	Recharge battery fully in normal manner	Be sure to recharge battery before it has discharged excessively.
	Recharging not done.		
	Terminal connection poor.	Clean terminals, and tighten.	Keep terminals clean and tight. Apply grease to prevent corrosion.
	Service life expired.	Change battery.	
Starter motor turns over weakly and battery charge lamp dims soon.	Recharging incomplete.	Recharge battery fully in normal manner.	Be sure to recharge battery completely before use.
Top of plate is white when viewed from electrolyte port.	Battery was used with insufficient amount of electrolyte.	Add distilled water, and recharge battery.	Check electrolyte level periodically.
	Battery was overdischarged without recharging.	Recharge battery fully in normal manner.	Be sure to recharge battery before it has discharged excessively.
Recharging is impossible.	Battery service life has expired.	Change battery.	
Terminal is corroded and becomes hot during operation.	Terminals improperly connected or stained.	Clean and tighten terminals.	Keep terminals clean and tight. Apply grease to prevent corrosion.
Electrolyte level drops quickly.	Battery case cracked or has pinhole.	Replace battery.	Fix battery case securely.

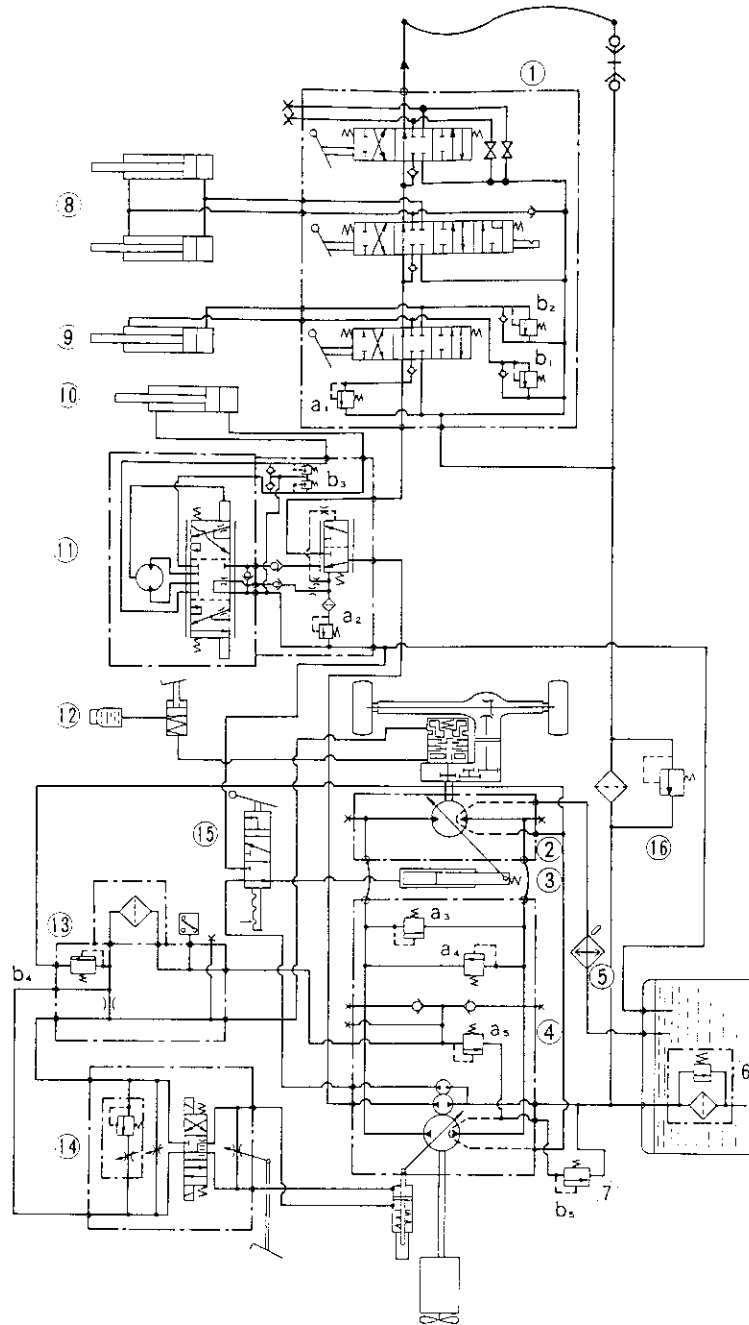
10. ELECTRICAL CIRCUIT DIAGRAM





11. HYDRAULIC CIRCUIT DIAGRAM

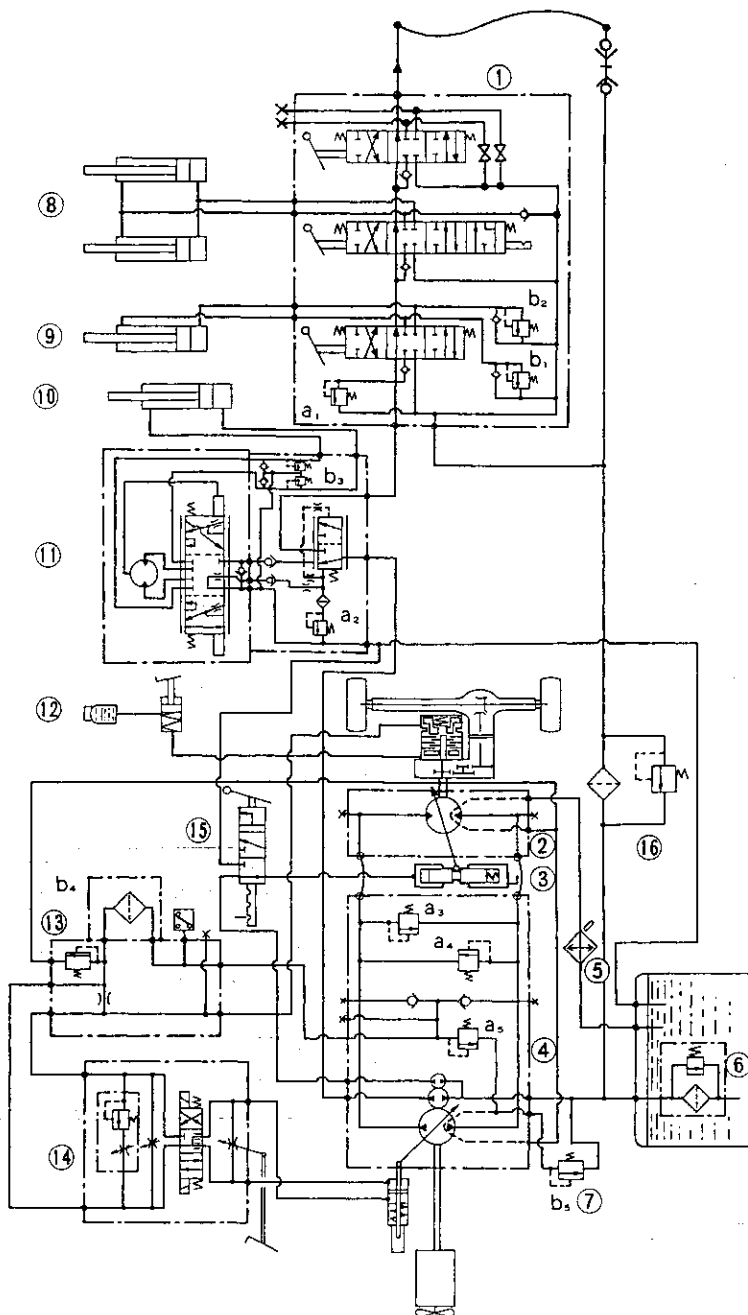
■ R310(B)



- ① Main control valve
- ② LST motor
- ③ Hi-Lo shift cylinder
- ④ LST pump
- ⑤ Oil cooler
- ⑥ Suction filter
- ⑦ Relief valve (bypass line)
- ⑧ Lift cylinder
- ⑨ Tilt cylinder
- ⑩ Steering cylinder
- ⑪ Steering controller
- ⑫ Brake master cylinder
- ⑬ Filter flange ass'y
- ⑭ LST control valve
- ⑮ Hi-Lo control valve
- ⑯ Return filter

a ₁	17.2MPa (2489psi, 175kgf/cm ²)
a ₂	17.2MPa (2489psi, 175kgf/cm ²)
a ₃	30.9MPa (4479psi, 315kgf/cm ²)
a ₄	30.9MPa (4479psi, 315kgf/cm ²)
a ₅	1.2MPa (171psi, 12kgf/cm ²)
b ₁	18.1MPa (2631psi, 185kgf/cm ²)
b ₂	18.1MPa (2631psi, 185kgf/cm ²)
b ₃	20.6MPa (2986psi, 210kgf/cm ²)
b ₄	1.3MPa (185psi, 13kgf/cm ²)
b ₅	0.5MPa (71psi, 5.0kgf/cm ²)

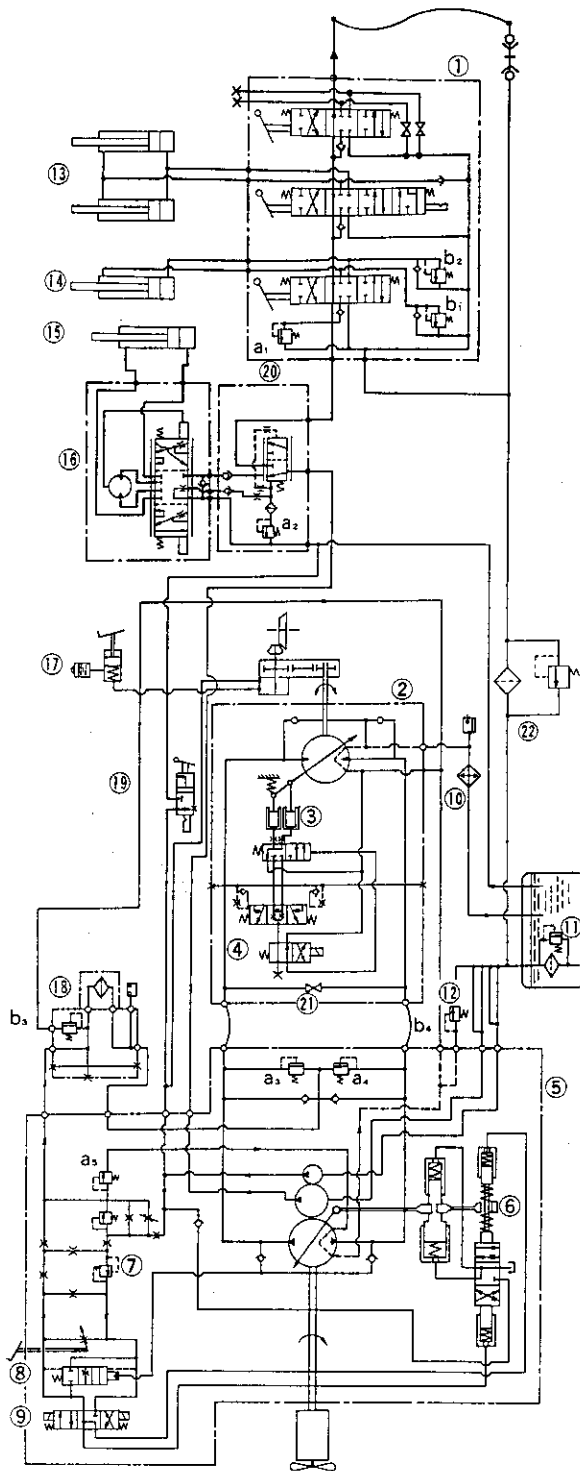
■ R410(B)



- ① Main control valve
- ② LST motor
- ③ Hi-Lo shift cylinder
- ④ LST pump
- ⑤ Oil cooler
- ⑥ Suction filter
- ⑦ Relief valve (bypass line)
- ⑧ Lift cylinder
- ⑨ Tilt cylinder
- ⑩ Steering cylinder
- ⑪ Steering controller
- ⑫ Brake master cylinder
- ⑬ Filter flange ass'y
- ⑭ LST control valve
- ⑮ Hi-Lo control valve
- ⑯ Return filter

a ₁	17.2MPa (2489psi, 175kgf/cm ²)
a ₂	17.2MPa (2489psi, 175kgf/cm ²)
a ₃	33.6MPa (4877psi, 343kgf/cm ²)
a ₄	33.6MPa (4877psi, 343kgf/cm ²)
a ₅	1.2MPa (171psi, 12kgf/cm ²)
b ₁	22.5MPa (3271psi, 230kgf/cm ²)
b ₂	22.5MPa (3271psi, 230kgf/cm ²)
b ₃	20.6MPa (2986psi, 210kgf/cm ²)
b ₄	1.3MPa (185psi, 13kgf/cm ²)
b ₅	0.5MPa (71psi, 5.0kgf/cm ²)

■ R510



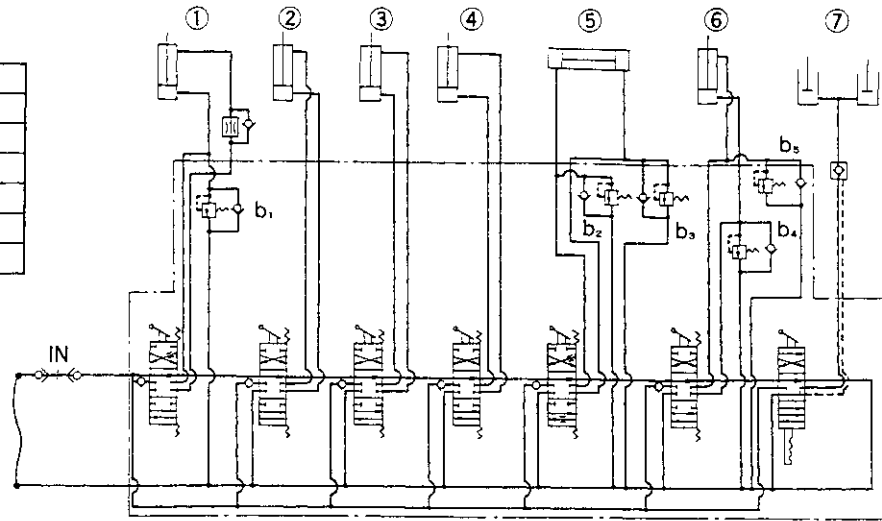
- ① Main control valve
- ② LST motor ass'y
- ③ Hi-Lo shift piston
- ④ Hi-Lo solenoid
- ⑤ LST pump ass'y
- ⑥ Servo-regulator
- ⑦ LST control valve
- ⑧ Horse power control valve
- ⑨ F-R solenoid
- ⑩ Oil cooler
- ⑪ Suction filter
- ⑫ Bypass relief
- ⑬ Lift cylinder
- ⑭ Tilt cylinder
- ⑮ Steering cylinder
- ⑯ Steering controller
- ⑰ Brake master cylinder
- ⑱ Filter flange ass'y
- ⑲ P-D control valve
- ⑳ Priority valve
- ㉑ Bypass valve
- ㉒ Return filter

a ₁	17.2MPa (2489psi, 175kgf/cm ²)
a ₂	17.2MPa (2489psi, 175kgf/cm ²)
a ₃	36.8MPa (5333psi, 375kgf/cm ²)
a ₄	36.8MPa (5333psi, 375kgf/cm ²)
a ₅	1.5MPa (213psi, 15kgf/cm ²)
b ₁	22.5MPa (3271psi, 230kgf/cm ²)
b ₂	22.5MPa (3271psi, 230kgf/cm ²)
b ₃	1.33MPa (193psi, 13.6kgf/cm ²)
b ₄	0.5MPa (71psi, 5.0kgf/cm ²)

12. HYDRAULIC CIRCUIT DIAGRAM FOR BACKHOE

■ R310(B)

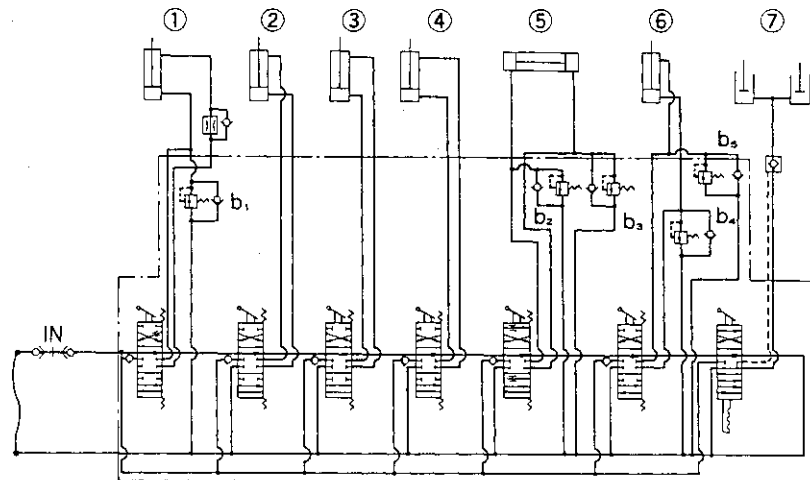
①	Dipperstick cylinder
②	Bucket cylinder
③	Outrigger cylinder, right
④	Outrigger cylinder, left
⑤	Swing cylinder
⑥	Boom cylinder
⑦	Lock cylinder



b ₁	21.1MPa (3057psi, 215kgf/cm ²)
b ₂	15.7MPa (2275psi, 160kgf/cm ²)
b ₃	15.7MPa (2275psi, 160kgf/cm ²)
b ₄	19.1MPa (2773psi, 195kgf/cm ²)
b ₅	19.1MPa (2773psi, 195kgf/cm ²)

■ R410(B)

①	Dipperstick cylinder
②	Bucket cylinder
③	Outrigger cylinder, right
④	Outrigger cylinder, left
⑤	Swing cylinder
⑥	Boom cylinder
⑦	Lock cylinder

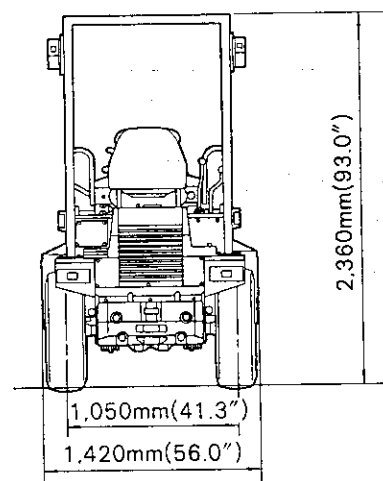
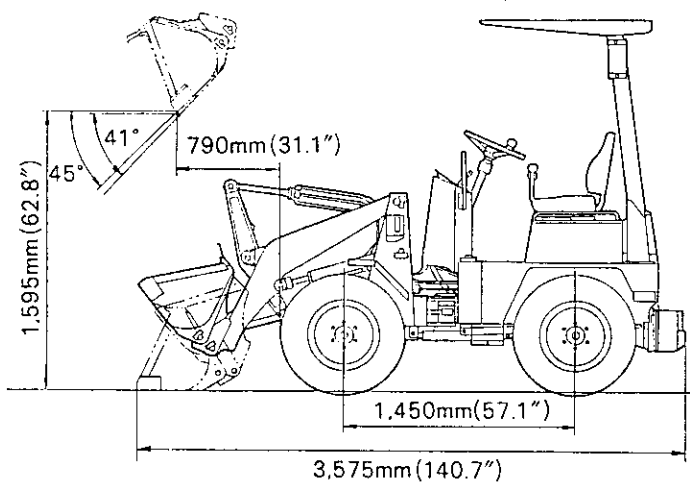
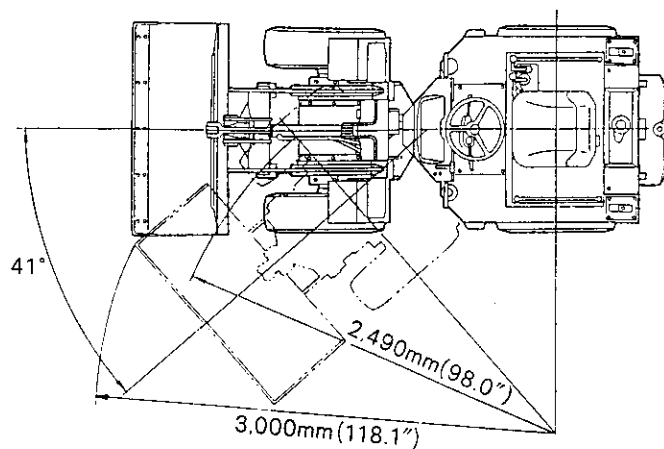


b ₁	21.1MPa (3057psi, 215kgf/cm ²)
b ₂	13.2MPa (1920psi, 135kgf/cm ²)
b ₃	13.2MPa (1920psi, 135kgf/cm ²)
b ₄	19.1MPa (2773psi, 195kgf/cm ²)
b ₅	19.1MPa (2773psi, 195kgf/cm ²)

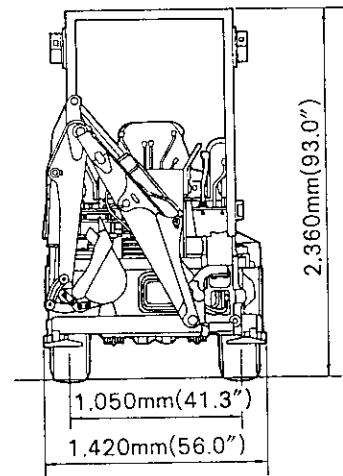
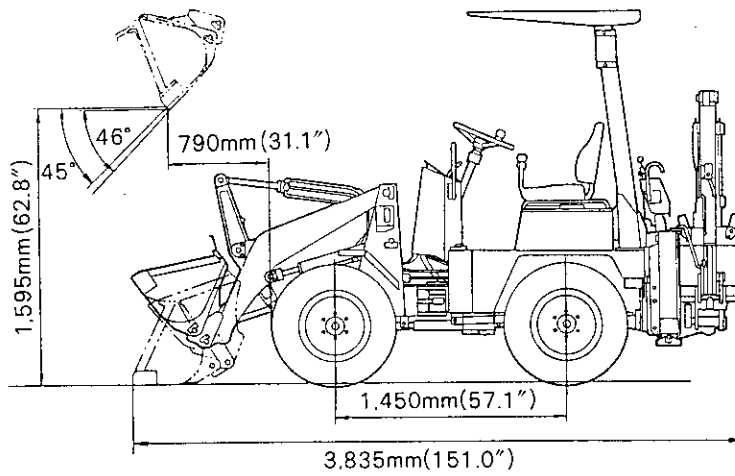
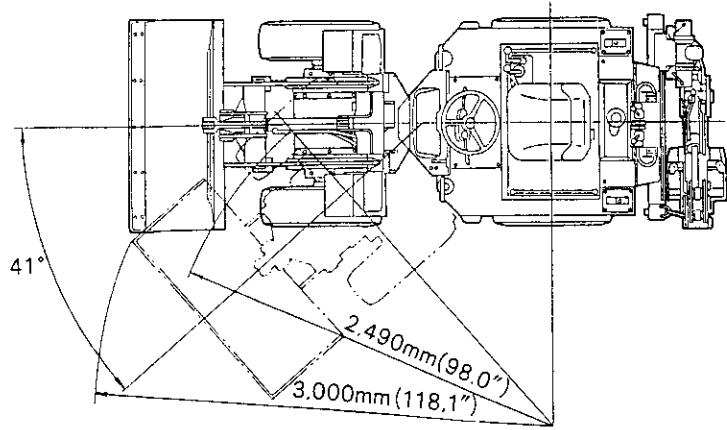
13. APPENDIX

■ Main Dimensions

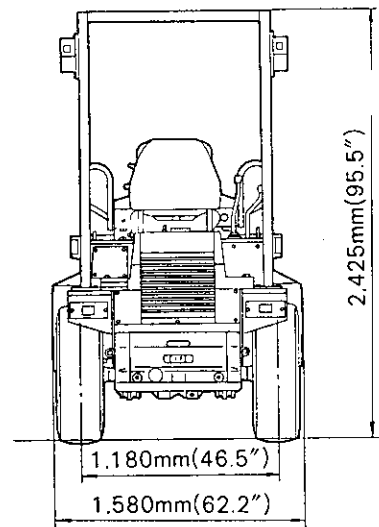
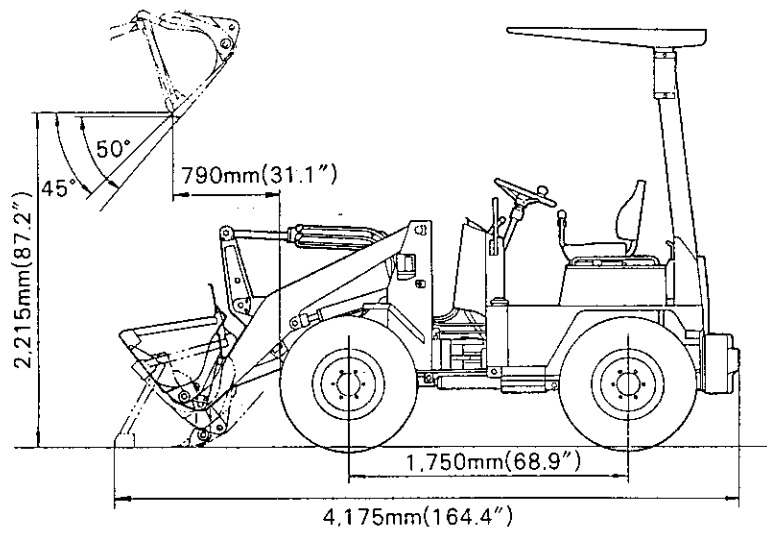
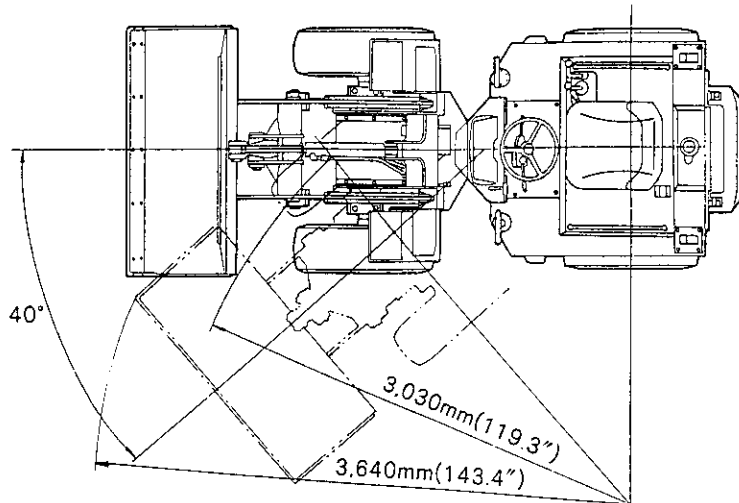
◆ R310



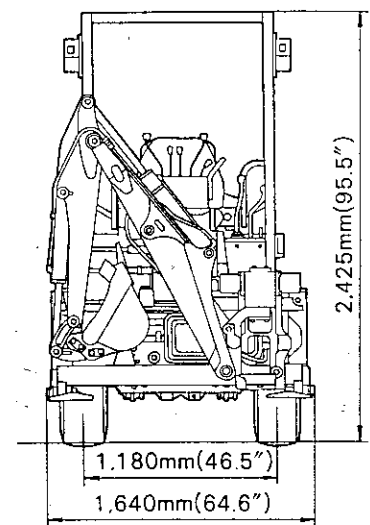
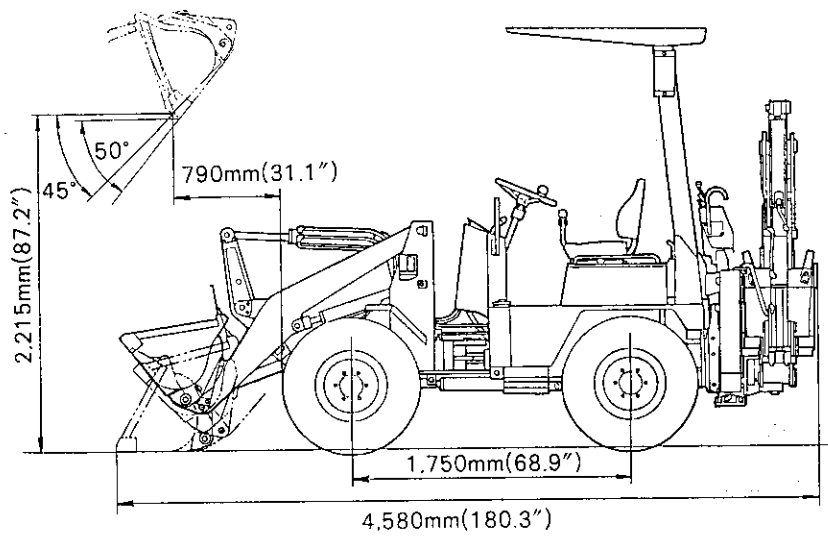
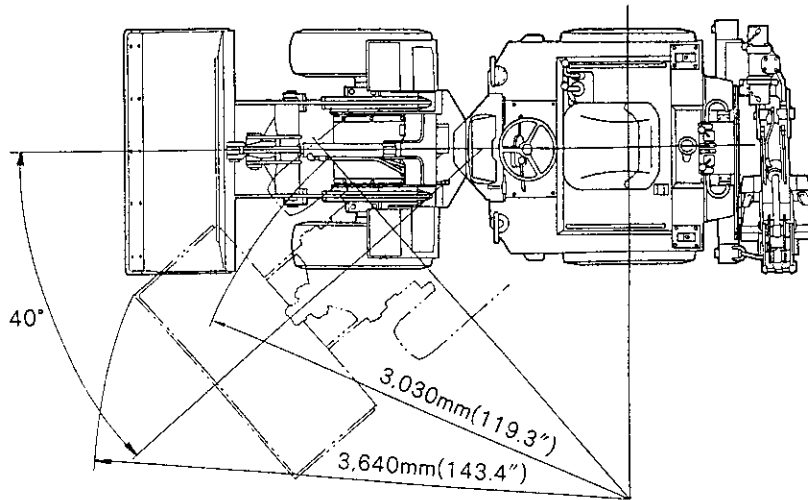
◆ R310B



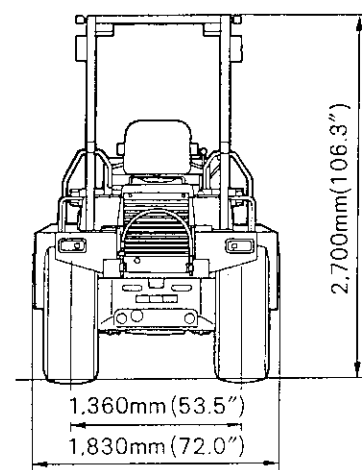
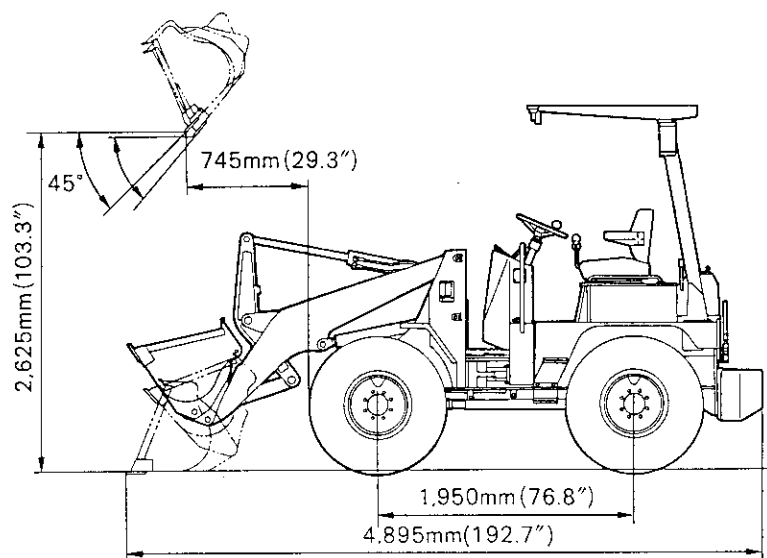
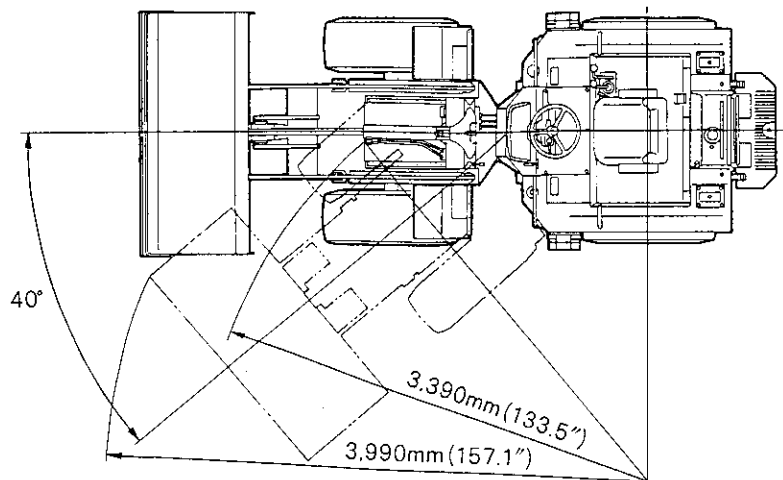
◆ R410



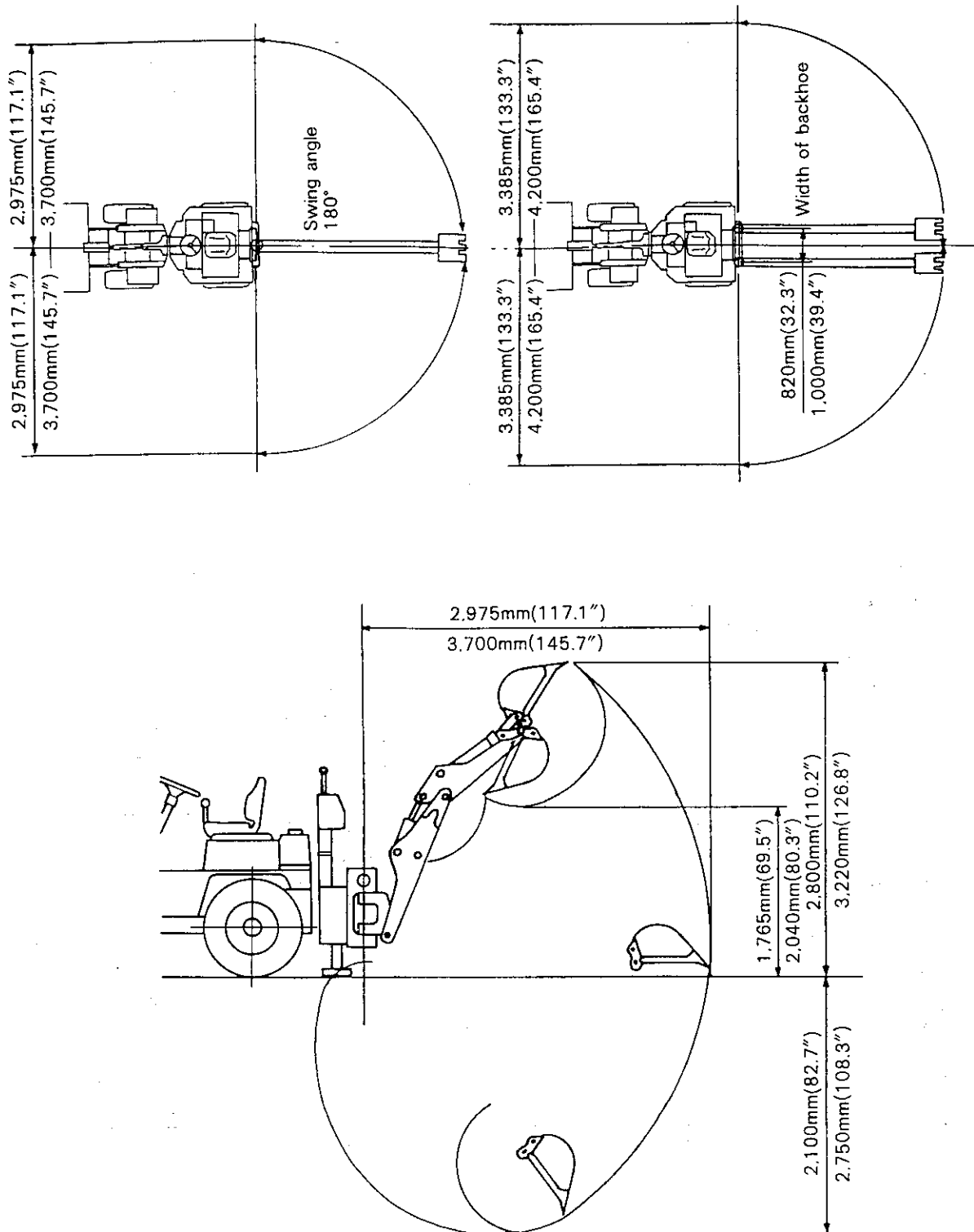
◆ R410B



◆ R510



◆ Main Dimensions for Backhoe



NOTE:

- The dimensions above the lines are for R310(B) and the underside ones for R410(B).

■ Specifications

Specifications are subject to change without notice for the purpose of improvement.

◆ R310(B)

Model name			Kubota Wheel Loader R310	Kubota Wheel Loader R310 with backhoe
Operating weight (with ROPS/FOPS)			2,220kg (4,895lbs)	2,220kg (4,895lbs)
Bucket capacity (SAE J742)			0.3m³ (0.4cu.yd)	0.3m³ (0.4cu.yd)
Operating load			500kgf (1,100lbs)	500kgf (1,100lbs)
Tipping load (Full turn)			1,420kgf (3,130lbs)	1,420kgf (3,130lbs)
Engine	Model Type		Water cooled, Kubota V1305-RP diesel engine	
	Engine output/rpm (SAE GROSS)		26.6HP/2,600rpm (19.8kW/2600rpm)	
	Max. torque (SAE GROSS)		8.5kgf-m (61.5lb-ft)	
	Total displacement		1,335CC (81.4cu-in.)	
	Starter		12V1.4kW	
	Battery		12V70Ah	
Dimensions	Overall length		3,575mm (140.7")	3,835mm (151.0")
	Overall width		1,420mm (56.0")	1,420mm (56.0")
	Overall height (with ROPS)		2,360mm (92.9")	2,360mm (92.9")
	Min. ground clearance		230mm (9.1")	230mm (9.1")
	Wheel base		1,450mm (57.1")	1,450mm (57.1")
	Tread		1,050mm (41.3")	1,050mm (41.3")
	Angle of articulation		41° (0.71 rad)	41° (0.71 rad)
	Loader clearance circle		5,975mm (235.3")	5,975mm (235.3")
Bucket	Dump height (without cutting edge)		1,595mm (62.8")	
	Reach, fully raised (without cutting edge)		790mm (31.1")	
	Lift capacity to maximum height		740kg (1,630lbs)	
	Breakout force		1,875kg (4,135lbs)	
Traveling mechanism	Drive system		4-wheel	
	Tire		Super wide 10-16.5-4PR	
	Traveling speed	Forward	1st	0~6.3km/h (0~3.9mph)
			2nd	0~14.0km/h (0~8.7mph)
		Reverse	1st	0~6.3km/h (0~3.9mph)
			2nd	0~14.0km/h (0~8.7mph)
	Gradability		30° (0.52 rad)	
Max. tractive force			1,600kgf (3,525lb-f)	
Backhoe	Max. digging depth		—	2,100mm (82.7")
	Max. digging height		—	2,800mm (110.2")
	Max. dumping height		—	1,765mm (69.5")
	Max. digging radius		—	2,975mm (117.1")
	Swing angle		—	180° (3.14rad)
	Width of boom slide		—	820mm (32.3")
	Bucket capacity/Bucket width		—	0.04m³ (1.34cu.ft)/450mm (18")

Note: Specifications taken with ROPS/FOPS canopy and STD bucket with quick coupler.

◆ R410(B)

Model name			Kubota Wheel Loader R410	Kubota Wheel Loader R410 with backhoe
Operating weight (with ROPS/FOPS)			2,755kg (6,070lbs)	3,205kg (7,065lbs)
Bucket capacity (SAE J742)			0.4m³ (0.5cu.yd)	0.4m³ (0.5cu.yd)
perating load			700kgf (1,545lbs)	700kgf (1,545lbs)
Tipping load (Full turn)			1,400kgf (3,085lbs)	2,080kgf (4,585lbs)
Engine	Model Type		Water cooled, Kubota V1902-BDW-3 diesel engine	
	Engine output/rpm (SAE GROSS)		39.5HP/2,600rpm (29.5kW/2,600rpm)	
	Max. torque (SAE GROSS)		12.5kgf·m (90.4lb·ft)	
	Total displacement		1,861CC (113.5cu.in.)	
	Starter		12V1.4kW	
	Battery		12V100Ah	
Dimensions	Overall length		4,175mm (164.4")	4,580mm (180.3")
	Overall width		1,580mm (62.2")	1,640mm (64.6")
	Overall height (with ROPS)		2,425mm (95.5")	2,425mm (95.5")
	Min. ground clearance		230mm (9.1")	230mm (9.1")
	Wheel base		1,750mm (68.9")	1,750mm (68.9")
	Tread		1,180mm (46.5")	1,180mm (46.5")
	Angle of articulation		40° (0.70 rad)	40° (0.70 rad)
	Loader clearance circle		7,280mm (286.6")	7,280mm (286.6")
Bucket	Dump height (without cutting edge)		2,215mm (87.2")	
	Reach, fully raised (without cutting edge)		790mm (31.1")	
	Lift capacity to maximum height		1,245kg (2,745lbs)	
	Breakout force		2,670kg (5,885lbs)	
Traveling mechanism	Drive system		4-wheel	
	Tire		Super wide 12.5/70-16 (6PLY)	
	Traveling speed	Forward	1st	0~7.6km/h (0~4.7mph)
			2nd	0~17.0km/h (0~10.6mph)
		Reverse	1st	0~7.6km/h (0~4.7mph)
			2nd	0~17.0km/h (0~10.6mph)
	Gradability		30° (0.52 rad)	
Max. tractive force			2,000kgf (4,410lb·f)	
Backhoe	Max. digging depth		—	2,750mm (108.3")
	Max. digging height		—	3,220mm (126.8")
	Max. dumping height		—	2,040mm (80.3")
	Max. digging radius		—	3,700mm (145.7")
	Swing angle		—	180° (3.14rad)
	Width of boom slide		—	1000mm (39.4")
	Bucket capacity/Bucket width		—	0.06m³ (2.27cu.ft)/450mm (18")

Note: Specifications taken with ROPS/FOPS canopy and STD bucket with quick coupler.

◆ R510

Model name			Kubota Wheel Loader R510		
Operating weight (with ROPS/FOPS)			3,895kg (8,585lbs)		
Bucket capacity (SAE J742)			0.57m³ (0.75cu.yd)		
Operating load			900kgf (2,000lbs)		
Tipping load (Full turn)			1,800kgf (4,000lbs)		
Engine	Model Type		Water cooled, Kubota V2203-BDW diesel engine		
	Engine output/rpm (SAE GROSS)		49.3HP/2,600rpm (36.8kW/2,600rpm)		
	Max. torque (SAE GROSS)		15.3kgf-m (110.6lb-ft)		
	Total displacement		2,197CC (134.1cu.in.)		
	Starter		12V2.0kW		
	Battery		12V70Ah		
Dimensions	Overall length		4,895mm (192.8")		
	Overall width		1,830mm (72.0")		
	Overall height (with ROPS)		2,700mm (106.3")		
	Min. ground clearance		330mm (13.0")		
	Wheel base		1,950mm (76.8")		
	Tread		1,360mm (53.5")		
	Angle of articulation		40° (0.70 rad)		
	Loader clearance circle		7,980mm (314")		
Bucket	Dump height (without cutting edge)		2,625mm (103.3")		
	Reach, fully raised (without cutting edge)		745mm (29.3")		
	Lift capacity to maximum height		1,500kg (3,300lbs)		
	Breakout force		2,970kg (6,550lbs)		
Traveling mechanism	Drive system		4-wheel		
	Tire		Super wide 15.5/70-18 (8PLY)		
	Traveling speed	Forward	1st	0~7.0km/h (0~4.3mph)	
			2nd	0~17.5km/h (0~10.9mph)	
		Reverse	1st	0~7.0km/h (0~4.3mph)	
			2nd	0~17.5km/h (0~10.9mph)	
	Gradability		30° (0.52 rad)		
Max. tractive force			3,200kgf (7,040lb-f)		

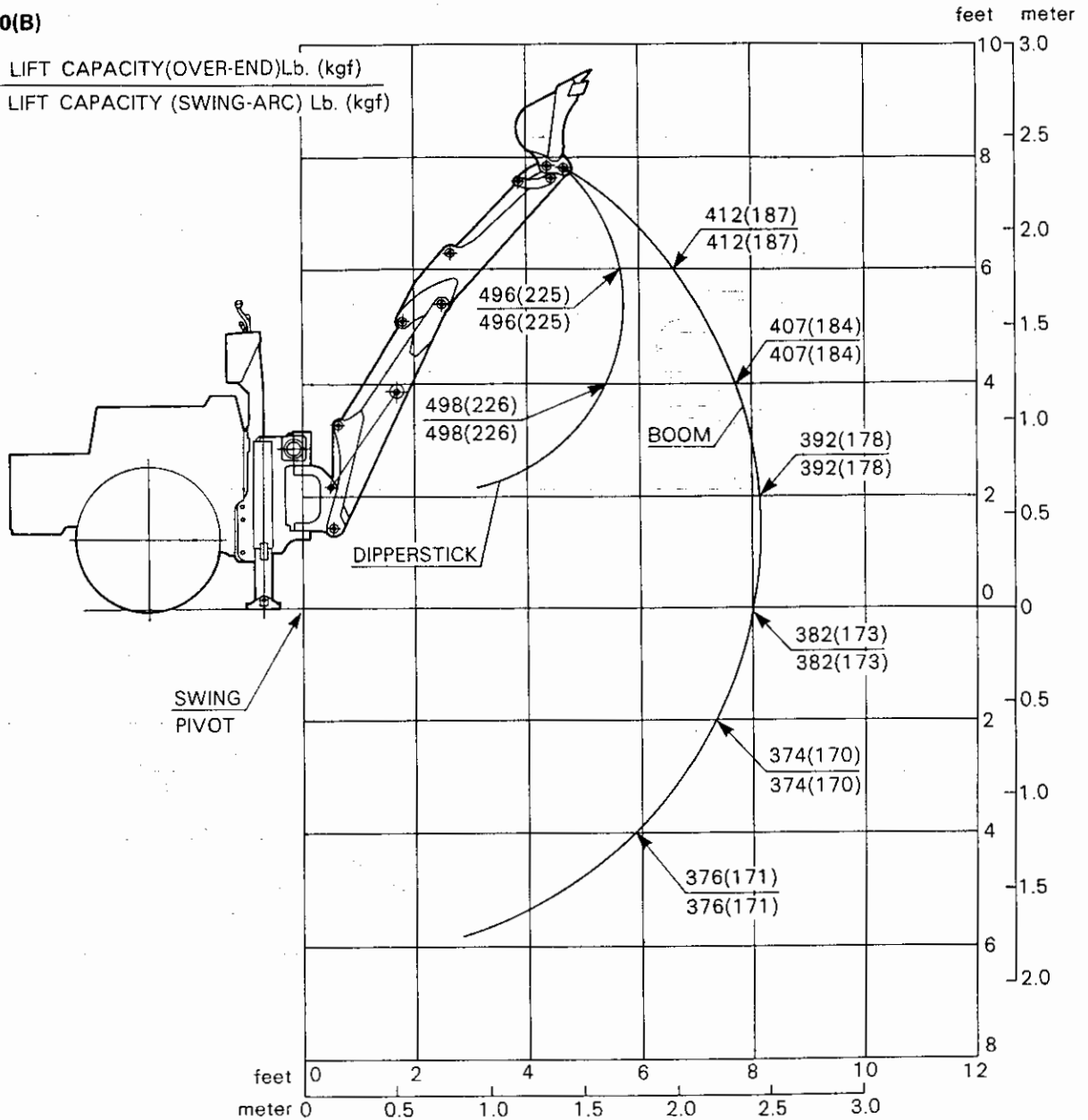
Note: Specifications taken with ROPS/FOPS canopy and STD bucket with quick coupler.

14. LIFTING CAPACITY

- Lift capacity figures on this chart are 87% of the maximum lift force per SAE Definition J31 and J49 at 2490 psi (175 kgf/cm²) system relief pressure and does not exceed 75% of the machine tipping load.
2. Top numbers - lift capacity within 45° either side of prime mover.
 3. Bottom numbers - lift capacity anywhere within full swing arc.
 4. Figures stated are determined by static tests and do not include dynamic factor.
- Machine conditions : Standard bucket, all else according to standard specifications.

■ R310(B)

RATED LIFT CAPACITY(OVER-END)Lb. (kgf)
 RATED LIFT CAPACITY (SWING-ARC) Lb. (kgf)



■ R410(B)

